

PARASITES OF WESTERN AUSTRALIA

VI

MYOBIIDAE PARASITIC ON BATS (ACARINA: PROSTIGMATA)

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and

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ABSTRACT

Mites of the family Myobiidae were studied in Australia by Womersley (1941), Domrow (1955, 1963, 1973), Fain (1973, 1974, 1976), and Fain and Lukoschus (1976). They are fur-mites confined to four orders of mammals: marsupials, insectivores, bats and rodents. In the present paper we deal with the species from bats in Australia, especially Western Australia.

Womersley (1941) described four species from South Australian bats: *Myobia miniopteris* from *Miniopterus schreibersi* and *Chalinolobus gouldii*; *Myobia clara* from unidentified bats; *Myobia minima* and *Myobia chalinolobus*, both from *Chalinolobus gouldii*.

Dusbabek (1973) redescribed the holotype of *M. chalinolobus* and transferred it to *Pteracarus*.

In the present paper we describe 8 new species and 2 new subspecies.

INTRODUCTION

During the Western Australia Field Programme 1976-1977, F.S.L. collected numerous myobiids on various bats from Western Australia. These comprise 15 species belonging to 8 genera, of which 8 species and 2 subspecies are new.

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Through the courtesy of Mr D.C. Lee, Curator of Arachnids, South Australian Museum, Adelaide, we could also examine the type series of the Myobiidae from bats described by Womersley, and other material. This contains a male labelled *Neomyobia clara* (Wom.) but the specimen is in fact a new species described below.

The length of the body includes the gnathosoma, the width is maximum.

The holotypes and allotypes of new species described below from Western Australia are deposited in the Western Australian Museum, Perth and paratypes in the Field Museum of Natural History, Chicago, Institute of Tropical Medicine, Antwerp, Belgium, and Department of Zoology, Catholic University of Nijmegen, The Netherlands.

The bats of the Kimberley expedition were identified by Dr Darrell Kitchener, Curator of Mammals, Western Australian Museum, Perth. They are in the collection of the Field Museum of Natural History, Chicago.

GENUS *ACANTHOPHTHIRIUS* PERKINS, 1925

Fain (1972a, 1972b, 1976a and 1976b) divided *Acanthophtirius* into 4 subgenera according to the characters of the males. It is represented in Australia by *Acanthophtirius s.s.* and *Myotimyobia* Fain, 1972.

Acanthophtirius s.l. contains 34 species, of which 17 belong in *Myotimyobia*. The typical subgenus contains 9 species including the three new ones described below.

A key of the males of *Myotimyobia* was given by Fain & Whitaker (1976). We give below a key of the males of *Acanthophtirius s.s.*

KEY TO SUBGENUS *ACANTHOPHTHIRIUS* (MALES ONLY)

(Male of *A. poppei* Trouessart, 1895 not seen)

- 1 Setae *d 1* and *d 2* subequal, 90-100 μ long
 - *A. etheldredae* Perkins, 1925
 - Seta *d 2* from 2,5 to 3 times longer than *d 1*
 - 2
- 2 Seta *ic 2* strong and very long (at least 200 μ)
 - 3
 - Seta *ic 2* thin and not longer than 60 μ
 - 5

- 3 External seta of coxa II a strong spine. Seta *ic* 4
120 μ long
... .. *A. womersleyi* sp. nov.
External seta of coxa II short and very thin.
Seta *ic* 4 thin and very short 4
- 4 Seta *ic* 2 regularly attenuated
... .. *A. plecotius* (Radford, 1938)
Seta *ic* 2 with base strongly inflated and spindle-
shaped
... .. *A. bohemicus* (Dusbabek, 1963)
- 5 Seta *ic* 4 very thick and barbed; seta coxal IV
very thick and long, situated very laterally, far
from *ic* 4. External seta of coxa II thin
... .. *A. noctulius* (Radford, 1938)
Seta *ic* 4 thin, not barbed; seta coxal IV thin
and short, close to *ic* 4. External seta of coxa
II strongly spinous
... .. 6
- 6 Setae *ic* 2 to *ic* 4 strong and equal or subequal
(60-65 μ). Femur and genu III with 2 or 3
strong, short spines
... .. *A. acinipus* sp. nov.
Seta *ic* 3 very thin and shorter (15-20 μ) than
ic 2 (30 μ) and *ic* 4 (80 μ), femur and genu III
with 1 spine
... .. *A. intercalatus* sp. nov.

1 *ACANTHOPHTHIRIUS CLARUS* (WOMERSLEY, 1941)

MYOBIA CLARA WOMERSLEY, 1941: 53

RADFORDIA CLARA RADFORD, 1951: 272

ACANTHOPHTHIRIUS CLARUS DUSBABEK, 1969: 552

This species is known only from females from unidentified bats from South Australia. In the absence of males it is not possible to determine its subgenus.

We have examined a female labelled: '*Neomyobia clara* (Wom. 1941). Ty. On bats M 499, 4418-31 Loc. S.A.'.

As Womersley did not designate a holotype we select this specimen as the lectotype.

Lectotype (Figs 1-3): 438 μ long (gnathosoma included) and 177 μ wide maximum. Dorsum: Most dorsal setae foliate-striate and finely attenuated apically. Setae *vi*, *sci*, *sce* and $\ell 1$ 66 μ , 96 μ , 140 μ and 150 μ long respectively. Setae *d4* and $\ell 3$ 63 μ and 57 μ long. Setae $\ell 4$ thin, at least 36 μ long (broken at apex). Vulvar lobes relatively small. Venter: Coxal setae 2-3-0-1. Setae *ic1* very small. Setae *ic2* strong, 70-80 μ long, *ic2* 60 μ apart. Setae *ic3* approximately as wide and as long as *ic2*, *ic3* 66 μ apart. Setae *ic4* a little thinner but longer (90 μ) than *ic2* and *ic3*, *ic4* 78 μ apart. Coxal seta IV about 30 μ long. Setae *g2* (internal) situated on same line as the *g1* (external); *g1* 30 μ , *g2* 18 μ long. Halfway between *g1-g2* and *ic4* is a pair of rounded sclerites 41 μ apart.

Chaetotaxy of legs II-IV: Trochanters 3-3-3. Femora 5-3-3. Genua 7-6-6. Most of these hairs unusually long; dorsal seta of trochanter III is 30 μ long, representing approximately 1,5 times length of corresponding genu.

Systematic position of *A. clara*

The separation of the species of *Acanthophtirius* is difficult in the absence of males, but *A. clara* seems to be distinguished by the combination of following characters: setae *ic2*, *ic3* and *ic4* long (70 to 90 μ); seta *ic3* closer to midline than to lateral border of body: setae *g1* and *g2* situated on a straight line; *g1* (external) approximately twice as long as *g2*; two opisthogastric sclerites rounded, equally distant from setae *ic4* and *g1-g2*, and separated by 41 μ ; dorsal seta of trochanter II and coxal seta IV 30 μ long; seta *sce* distinctly longer (140 μ) than *sci* seta (96 μ).

Host and locality

On unidentified bats from South Australia. Lectotype in South Australian Museum, Adelaide.

2 ACANTHOPHTHIRIUS (ACANTHOPHTHIRIUS)

WOMERSLEYI SP. NOV.

In the series of mites sent to us by the Curator of the South Australian Museum, Adelaide, we found one slide containing a male and labelled as

follows: '*Neomyobia clara* (Wom.) ♂, det. H. Womersley. *Miniopterus gouldi* Warbla cave, Nullabor, S. Aust. Jan. 1961 (coll. Aitken, H. Mincham)'.

This specimen belongs to the typical subgenus of the genus *Acanthophthirius* by most of the characters. It is, however, clearly distinct from the 5 other species known in that subgenus. We do not think that it represents the male of *A. clarus* (Wom.) mainly because the size of this specimen is much larger than the holotype of *A. clarus*. In all the known species of the genus *Acanthophthirius* the male is always distinctly smaller than the female. We assume therefore that this male belongs to a new so far undescribed species. We describe here that new species and give it the name *A. womersleyi*, from the late Australian acarologist H. Womersley.

Male (Figs 4-5, 33): Holotype 540 μ long and 255 μ maximum wide. Dorsum: setae *ve* 24 μ wide in its anterior part and strongly attenuated posteriorly, 150 μ long. Setae *sci*, *sce* and *l1* 84 μ , 180 μ and 195 μ long respectively. Genital sclerite very slightly asymmetric, bearing 4 pairs of small setae. Setae *d2* much longer (135 μ) than *d1* (54 μ). Penis thin, 165 μ long. Venter: seta *ic2* with a short and very thick, asymmetrical base, and a very long narrow apical part, its total length is 200 μ . Seta *ic3* thin and short (20 μ). Seta *ic4* 120 μ long. Distance *ic2-ic2* 15 to 20 μ . Coxal setae (II to IV): 2-3-0-1. External seta of coxa II is a strong spine 30 μ . Cuticle strongly produced laterally between legs III and IV, forming a verrucous lobe recurved ventrally. Leg I ending in a pair of small claws. Legs II and III thicker than legs IV; leg II with one strong claw (45 μ long) and one very small claw (12 μ long); leg III bearing an anterior very strong claw, 45 μ long, and a posterior smaller and 30 μ long. Leg IV with two thinner and subequal claws. Trochanter and femur I with a strong spine. Femur and genu III bearing each a strong conical spine and a wider flattened denticulate spine. These strong flattened spines are not observed in the other species of the subgenus *Acanthophthirius*.

Host and locality

On *Miniopterus gouldi*, Warbla Cave, Nullabor, South Australia, January 1961. There is only one species of bat in Australia with the name *gouldii*, it is *Chalinolobus gouldii*. The true host of this mite should be therefore either a *Miniopterus* sp. or *Chalinolobus gouldii*.

Holotype in the South Australian Museum, Adelaide.

3 ACANTHOPHTHIRIUS (ACANTHOPHTHIRIUS)

ACINIPUS SP. NOV.

The male of this species presents the main characters of the typical subgenus, e.g. the presence of a big spine on anterior surface of both trochanter and femur II, the great inequality of claws II and the production of the cuticle laterally between legs III and IV. However all the legs are relatively narrow and by this character it is closer to the subgenus *Myotimyobia*.

Male (Figs 6-7, 35): Holotype 480 μ long and 213 μ wide. Dorsum: genital orifice slightly asymmetrical, a little in front of setae ℓ 1. Penis 135 μ long. Setae d 1 and d 2 54 μ and 150 μ long respectively. Setae ℓ 1 186 μ long. The 3 pairs of posterior setae subequal (21 μ). Venter: coxal setae 2-3-0-1. The latero-coxals II are strong spines. Setae ic 2 to ic 4 60 μ , 60 μ and 66 μ respectively.

Chaetotaxy of legs II-IV: Trochanters 3-3-3. Femora 5-3-3. Genua 7-7-6. There are strong spines on trochanter II, on femora II-III, on genua III and IV, and tibiae III-IV.

Female (Figs 8-10): Allotype 558 μ long and 230 μ wide. Dorsum: Setae u i , sci , sc e , ℓ 1 and d 1 69 μ , 165 μ , 105 μ , 205 μ and 75 μ long respectively. Setae d 4, ℓ 3 and ℓ 4 thin and 60 μ , 60 μ and 40 μ long. Genital lobes large. Venter: Coxal setae 2-3-0-1. Setae ic 2 to ic 4 75 μ , 105 μ and 80 μ long. Setae ic 3 are 78 μ apart, ic 4 100 μ apart. Opisthogaster sclerites rounded, 39 μ apart, they are situated at the same distance (60 μ) from the g 2 and the line joining ic 4 setae (63-65 μ). Setae g 1 setae longer (33 μ) than g 2 (22 μ).

Chaetotaxy of the legs II-IV: Same number of setae as in the male, the genua II and III also bear 7 setae.

Host and locality

- 1 On *Nycticeius greyi* (Gould, 1858), from Beverley Springs, 19, 20 and 23.IX.1976 (bats no. 2773 and 2797) (Holotype and 1 paratype male, allotype female and 3 paratype nymphs.) Also 14 nymphs and 1 larva (all paratypes) on same host but Beagle Bay, 23.VIII.1976 (bat no. 2612) and 4 nymphs (paratypes) from same host but Mitchell Plateau, 22.X.1976 (bat no. 3076).
- 2 On *Eptesicus pumilus* Gray, 1841, from Beverley Springs, 19.IX.1976 (bat no. 2739) (15 paratype nymphs).

4 *ACANTHOPHTHIRIUS (ACANTHOPHTHIRIUS)*

INTERCALATUS SP. NOV.

This species is distinguished from *A. (A.) acinipus* sp. nov., in the male by the much smaller length of the *ic* 2 and *ic* 3 setae, the greater length of *ic* 4 and the presence of only one spine on femur and genu III; in the female by the different situation of the opisthogastric sclerites, which are closer to *g* 2 setae (distance 55 μ) than to *ic* 4 setae (72 μ).

Male (Figs 11-12, 36): Holotype 495 μ long and 213 μ wide. Dorsum: Setae *sc i*, *sc e*, *d* 1, *d* 2, ℓ 1 105 μ , 163 μ , 57 μ and 195 μ long respectively. Genital orifice at 15 μ in front of ℓ 1, genital plate almost symmetrical. Penis 120 μ long. Venter: Setae *ic* 2, *ic* 3 and *ic* 4 30 μ , 15-20 μ and 80 μ long respectively. External seta of coxa II is a strong spine. Legs with strong spines on trochanter II, on femora II and IV, on genua III and tibiae III and IV. Genua II to IV with 7-6-6-setae.

Female (Figs 13-15): Allotype 606 μ long and 240 μ wide. Dorsum: Setae *vi* 15 μ wide. Setae *sc i*, *sc e*, *d* 1, ℓ 1, *d* 3 ℓ 3 and ℓ 4 117 μ , 175 μ , 90 μ , 185 μ , 90 μ , 66 μ and 51 μ long respectively. Cuticle behind the genital lobes finely verrucous. Venter: Setae *ic* 2 to *ic* 3 90 μ , 96 μ and 105 μ long respectively. Distance *ic* 3-*ic* 3 = 87 μ ; *ic* 4-*ic* 4 = 112 μ . Opisthogastric sclerites rounded, 40 μ apart; they are situated at 72 μ from *ic* 4 and at 55 μ from *g* 2.

Host and locality

On *Nyctophilus arnhemensis* Johnson, 1959, Beverley Springs, 19.IX.1976 (bats no. 2741 and 2742) (Holotype and 3 paratype males, allotype female, 2 paratype nymphs).

5 *ACANTHOPHTHIRIUS (MYOTIMYOBIA) MINIMUS*

(WOMERSLEY, 1941) COMB. NOV.

MYOBIA MINIMA WOMERSLEY, 1941: 55

The holotype and so far only specimen known of this species is not a female as thought by Womersley, but a tritonymph.

This nymph presents the main characters of *Acanthophtirius*. Legs I are symmetrical, legs II have 2 claws, legs III-IV have 1 claw, setae *ic* 2 to *ic* 4 are long, the 2 pairs of coxal II setae are strong striated spines.

We have found on several bats of *Chalinolobus* from Australia and New Guinea adult mites and nymphs of a species of *Acanthophthirius* which correspond very probably to *A. minimus*. We describe here the adults of this species.

Female (Figs 16-18): Body size in 2 specimens from *Chalinolobus gouldii*, from Kangaroo Flats, Melbourne (length x width): $564\ \mu \times 238\ \mu$ and $560\ \mu \times 228\ \mu$. In two specimens from *Chalinolobus nigrogriseus rogersi* these measurements are $570\ \mu \times 220\ \mu$ and $561\ \mu \times 216\ \mu$. The following description is based on a specimen from the typical host. Dorsum: Setae *sc i*, *sc e*, *d 1*, *l 1*, *d 3*, *l 3*, *l 4* $105\ \mu$, $150\ \mu$, $87\ \mu$, $175\ \mu$, $72\ \mu$, $57\ \mu$, $57\ \mu$ long respectively. Genital lobes large. Venter: *ic 2*, *ic 3* and *ic 4* approximately $60\ \mu$ long. Setae *ic 3* closer to the median line ($48\ \mu$) than to the lateral margin of body ($66\ \mu$). Setae *ic 4* $105\ \mu$ apart. Coxal IV seta thin and $27\ \mu$ long. Setae *g 1* and *g 2* on a convex line; they are subequal in length ($48\ \mu$). Opisthogaster with two large crescentic sclerites about $60\ \mu$ apart and much closer to *ic 4* ($30\ \mu$) than to *g 2* ($75\ \mu$). Leg setae relatively long and thin.

Male (Figs 19, 20, 32): Our description is based on a specimen from *Chalinolobus nigrogriseus rogersi*. This specimen presents the characters of the subgenus *Myotimyobia*. Body $387\ \mu$ long and $159\ \mu$ wide. Dorsum: Setae *sc i* shorter ($78\ \mu$) than *sc e* ($113\ \mu$); *d 1* shorter ($50\text{--}55\ \mu$) than *d 2* ($75\ \mu$). Genital plate enlarged anteriorly with two produced lateral corners, almost symmetrical, ending posteriorly into two subequal triangular projections. Penis rather strong, $100\ \mu$ long. Venter: Setae *ic 2*, *ic 3* and *ic 4* $48\ \mu$, $60\ \mu$ and $60\ \mu$ long. Distance *ic 3*–*ic 3* = $75\ \mu$; distance *ic 4*–*ic 4* = $80\ \mu$. All the coxal setae thin. Legs not inflated and without spines; the setae are mainly thin and long, exceptionally slightly spinous.

Hosts and localities

- 1 *Chalinolobus gouldii* (Gray, 1841), South Australia (bat no. M401,506) (holotype nymph, in the South Australian Museum, Adelaide). From the same host, from Kangaroo Flats, Melbourne (bat in the collection of British Museum) no. 99.7.4.1 (2 females) (Coll. A. Fain).
- 2 *Chalinolobus gouldii venatoris*, Thomas, 1908 from Alexandria, Northern Territory, Australia (bat no. 7.1.4.5-6 in the British Museum) (1 female) (Coll. A. Fain).
- 3 *Chalinolobus nigrogriseus rogersi* Thomas, 1909, Napier Downs, Western Australia, 20 and 30.VIII.1976 (bats no. 2626, 2763, 2769) (11 females, 10 males, 3 nymphs, 2 larvae) (Coll. F. Lukoschus).

4 *Chalinolobus nigrogriseus* (Gould), New Guinea, bat no. 1970-2001-2005, in the British Museum (1 female) (Coll. A. Fain).

6 *ACANTHOPHTHIRIUS (MYOTIMYOBIA) ALATUS* SP. NOV.

This new species is characterized in the male by the presence on the posterodorsal surface of the trochanters III of a membranous triangular lobe directed posteriorly. Such a lobe is absent in all the other known species. Female very close to *A. (M.) intercalatus*.

Male (Figs 21-22, 34): Holotype 405 μ long and 165 μ wide. Dorsum: Genital orifice situated at the level of ℓ 1; genital sclerite almost symmetrical, bearing 4 pairs of small setae. Penis 110 μ long; narrow in its distal half. Setae *sc i* shorter (84 μ) than the *sc e* (130 μ). Setae *d 1* and *d 2* respectively 48 μ and 135 μ long. The three posterior pairs of setae are stiff, sub-cylindrical and 18-20 μ long. Venter: Coxal setae (II-IV) 2-3-0-1. Coxal IV thin and 12 μ long. Setae *ic 2* to *ic 4* 50 μ , 55 μ and 90 μ long. Distances *ic 3-ic 3* = 59 μ ; *ic 4-ic 4* = 66 μ . Legs II to IV not inflated. Claws: Tarsi I with a pair of very small claws; tarsi II with 2 very unequal claws; tarsi III and IV with 2 claws slightly unequal in width. Trochanter III with a triangular membranous lobe on its posterior surface. Chaetotaxy of legs II-IV: Trochanters 3-3-3. Femora 5-3-3. Genua 7-6-6. Tibias 6-6-6. Trochanter and femur I without strong spines and the internal coxal II is not spinous.

Female (Figs 23-25): Allotype 525 μ long and 210 μ wide. Dorsum: Dorsal setae relatively thick. Setae *vi* being 14 μ wide; *vi*, *sc i*, *sc e*, ℓ 1 and *d 1* 78 μ , 84 μ , 132 μ , 150 μ and 75 μ long respectively. Setae *d 4*, ℓ 3 and ℓ 4 are thin and 60 μ , 50 μ and 38 μ long respectively. Genital lobes well developed. Venter: Coxal setae as in the male; setae *ic* longer than in the male. Setae *g 2* (internal) a little in front of *g 1* setae, the former being a little shorter than the latter. Opisthogaster sclerites rounded and 36 μ apart; they are closer to *g 2* setae (42 μ) than to *ic 4* setae. Chaetotaxy of the legs: Most of setae thin and long; number of setae as in the male.

Host and locality

On *Eptesicus douglasi* Kitchener, 1976 from Geikie Gorge. On 4 bats (no. 2916, 2926, 2979, 2980), 4 to 9.X.1976 (Holotype male, allotype and 6 paratypes female, 11 nymphs and 1 larva, all paratypes).

From the same host, from Brooking Springs (bats no. 2893 and 2903), 3.X.1976. (6 nymphs).

GENUS *Calcarmyobia* RADFORD, 1948

Four species have been described so far in *Calcarmyobia*: *C. rhinolophia* (Radford, 1940) (the type species), *C. miniopteris* (Womersley, 1941), *C. parenzani* Lombardini, 1956 and *C. japonica* Uchikawa, 1976.

The typical host of *C. rhinolophia* is *Rhinolophus lobatus*, from Kenya. This species has also been recorded from other bats, mainly *Miniopterus schreibersi*, in several countries of Africa and Europe.

C. miniopteris has been described from *Miniopterus schreibersi* and *Chalinolobus gouldii* in Australia. Several authors have put this species in synonymy of *C. rhinolophia*.

The typical host of *C. parenzani* is not known. It was an unidentified bat, from a cave, in Italy.

C. japonica was described from *Miniopterus schreibersi fuliginosus* in Japan. According to Uchikawa, this species is only separable with certainty from *C. rhinolophia* by the characters of the genital plate and the dorsal chaetotaxy of the male.

The junior author collected on *Miniopterus schreibersi* from Western Australia, males and females that agree perfectly with the description and the figures of *C. japonica*. Through the courtesy of Dr Uchikawa we were able to examine a male and a female of that species collected on the typical host in Japan, and to confirm the original description. From these findings it appears that in Japan and in Australia, and probably in other countries of East Asia, the bat *Miniopterus schreibersi* harbors a species of *Calcarmyobia* that is distinct from the true *C. rhinolophia*. This species has been named *C. miniopteris* by Womersley in 1941. According to the law of priority, the name *C. japonica* Uchikawa published in 1976 is a junior synonym of the former (Figs 43-45).

Recently, Dr Domrow sent to the senior author a male and two females labelled '*Calcarmyobia rhinolophia*'. These mites were collected on *Miniopterus australis*, from Queensland. The male agrees with *C. miniopteris* except that the genital plate is shorter and that the *d* 2 and the *g p* are slightly thicker than in that species. It is therefore more or less intermediate between *C. miniopteris* and *C. rhinolophia*, however closer to the former. In the two females the *d* 3, *d* 4 and *ℓ* 2 have a longer posterior narrow part than in both *C. miniopteris* and *C. rhinolophia*. These specimens could represent a new form of *C. miniopteris* (Figs 46-48, 51).

TABLE 1

Main characters of the males of *Calcaromyobia rhinolophia* and *C. miniopterus* from different hosts and countries (in microns)

| Specimen | <i>C. rhinolophia</i> (Figs 37-42) | | <i>C. miniopterus</i> (= <i>C. japonica</i>) (Figs 43-48) | | |
|-----------------------------|---------------------------------------|--------------------------------|---|--------------------------------|------------------------------|
| | Type male | 1 male | 1 male | 2 males | 1 male |
| Host of specimens | <i>Rhinolophus lobatus</i> | <i>Miniopterus schreibersi</i> | <i>Miniopterus schreibersi</i> | <i>Miniopterus schreibersi</i> | <i>Miniopterus australis</i> |
| Origin of specimens | Kenya | Czechoslovakia | Poland | W. Australia | Queensland |
| Length of setae | | | | | |
| <i>vi</i> | 165 | 147 | 150 | 110-120 | 108 |
| <i>sci</i> | 82 | 78 | 75 | 58-63 | 60-63 |
| <i>d1</i> | 15 | 22 | 19 | 18 | 15 |
| <i>d2</i> | 48 | 33 | 30 | 25-30 | 30-33 |
| <i>l2</i> | 45 | 45 | 40 | 65-75 | 56 |
| <i>gp</i> | 7-7,5 | 6 | 5 | 13-15 | 15 |
| Maximum width of setae | | | | | |
| <i>d2</i> | 4,5-5 | 4 | 6 | 1,8-2 | 3-3,2 |
| <i>l2</i> | 4,5-5 | 6 | 5 | 7-7,5 | 6-7 |
| <i>gp</i> | 2 | 0,5 | 0,5 | 3,6-4,5 | 5-6 |
| Presence of <i>ga</i> setae | small | large | large | ? | ? |
| Genital plate: | | | | | |
| maximum length | 51 | 50 | - | 54 | 42 |
| maximum width | 36 | 40 | - | 38 | 42 |

Moreover, the male specimens of *Calcarmyobia* found so far in Europe on *Miniopterus schreibersi* and attributed to *C. rhinolophia* by several authors differ from the typical material, as well as from *C. miniopterus*, by the chaetotaxy, mainly the setae of the genital area. In these specimens setae *d 2* shorter and not attenuated apically, *g a* larger and *g p* much thinner. Besides, other setae differ slightly in shape, i.e. *v i* not punctate in their posterior membranous part and *sc i* shorter and their posterior membranous part shorter (Figs 40-42). Should these characters receive a specific importance, then the species inadequately described by Lombardini (*C. parenzani*) might probably become valid as representing the populations parasiting *Miniopterus schreibersi* in Europe.

We have summarized in Table 1 the main characters which separate the males of *C. rhinolophia* from those of *C. miniopterus*.

1 *CALCARMYOBIA MINIOPTERIS* (WOMERSLEY, 1941)

MYOBIA MINIOPTERIS WOMERSLEY, 1941: 52

CALCARMYOBIA JAPONICA UCHIKAWA, 1976: 56 syn. nov.

This species has been described from South Australia from two different hosts: *Miniopterus schreibersi* Kuhl, 1819 (typical host) and *Chalinolobus gouldii*. Only female specimens were known.

In Western Australia we found it on the typical host from Mitchell Plateau. The specimens were collected from 3 different bats: no. 3003, 17.X.1976 (2 females and 5 nymphs); no. 3021, 19.X.1976 (5 females, 2 males and 7 nymphs); no. 3026, 20.X.1976 (3 nymphs).

The specimens described as *Calcarmyobia japonica* were collected from *Miniopterus schreibersi fuliginosus*, in a cave in Miyazaki Prefecture, Kyushu, Japan.

We give here drawings of the genital area and of setae *v i* and *sc i* in the males and of *d 3*, *d 4* and *ℓ 2* of the females of the following specimens: the type of *C. rhinolophia* (Radford) (Figs 37-39, 49); 1 specimen from *Miniopterus schreibersi* from Kashiwazaki, Niigata Prefecture, Japan (labelled *C. japonica*) (kindly sent by Dr Uchikawa) (Figs 43-45, 50); 1 specimen from *Miniopterus australis*, sent by Dr R. Domrow (Figs 46-48, 51).

GENUS *HIPPOSIDEROBIA* DUSBABEK, 1968

The genus *Hipposiderobia* contains, so far, 7 species, all parasitic on Hipposideridae.

We describe here a new species discovered on *Rhinonictoris aurantius*, from Western Australia.

1 *HIPPOSIDEROBIA BELLI* SP. NOV.

This new species is distinguished by the structure of the *ic* 2 to *ic* 4 setae in the female which are stronger and from 2 to 3 times longer (13 to 18 μ) than in all other known species.

This mite is named after Mr Cameron Bell, Brooking Springs Station, who helped us considerably during our expedition.

Female (Figs 52-53): Holotype 290 μ long and 180 μ wide. Dorsum: Setae *d* 1 are much thicker and longer (29 μ) than the *d* 2 and the ℓ 2 which are very thin and short (4 to 6 μ); setae *d* 3 situated at 45 μ behind the ℓ 2; the *sc e* and the ℓ 1 are 78 μ and 75 μ long respectively. Venter: Setae *ic* 1, *ic* 2, *ic* 3 and *ic* 4 relatively thick at their base and 15 μ , 18 μ , 16 μ and 13 μ long respectively. Coxal setae: 2-3-0-0. Internal pair of coxa II very short (3 μ). Chaetotaxy of the legs (II-IV): Trochanters 3-3-3. Femora 5-2-2. Genua 6-5-5. Tibiae 6-5-5. Tarsi 6-3-3.

Male (Figs 31, 54-55): Allotype 222 μ long and 138 μ wide. Dorsum: Genital orifice at the level of setae *sc e*. Genital sclerite bearing 5 pairs of minute spinelets. Seta *d* 1 close to the genital sclerite and short (5 μ long). Penis 100 μ long, straight. Venter: Setae *ic* 1 to *ic* 4 as in the female but a little shorter. Gnathosoma 42 μ long (dorsally), relatively narrow. Chaetotaxy of the legs II-IV: As in the female.

Host and locality

From *Rhinonictoris aurantius* Gray, 1845, from Geikie Gorge, 29.IX.1976, bat no. 2839 (1 female paratype); 3.X.1976 (bat no. 2897) (1 nymph); 8.X.1976, bats no. 2965 (holotype female, allotype and 1 paratype male) and no. 2976 (1 female paratype, 3 male paratypes, 4 nymph paratypes, 1 egg).

The mites have been found in the poorly hairy regions of the wing membrane, in front of the fore legs, with all the legs attached to the wing membrane and not to the hairs.

GENUS *EWINGANA* RADFORD, 1952

SUBGENUS *EWINGANA* RADFORD, 1952

The genus name *Ewingana* was created by Radford in 1948, with *E. bispinosa* Radford, 1948 as type species. However Radford did not give a description of the latter and therefore both the genus and the species were *nomina nuda*. Both names are, however, made available by Radford in his paper of 1952. They should therefore be cited with the date 1952 (R.V. Melville, in litt.).

1 *EWINGANA (EWINGANA) BISPINOSA* RADFORD, 1952

Ewingana (E.) bispinosa Radford, 1952 has been described from *Tadarida cistura* (= *Nyctinomus cisturus*), from Uganda. Only the female (Fig. 56) has been described.

We have collected on *Tadarida jobensis*, in Western Australia, a series of mites including females and males. The females agree very closely with the species of Radford. The males, however, show several differences with male specimens of *E. bispinosa* collected by the senior author from Central Africa on several *Tadarida* spp. We think therefore that the Australian specimens belong to a new subspecies of *E. bispinosa* which we describe hereunder.

EWINGANA (EWINGANA) BISPINOSA SSP. *LONGISPINA* SUBSP. NOV.

Male (Fig. 57): Holotype 480 μ long and 195 μ wide. Dorsum: Setae *vi* relatively thick and 45 μ long; *sci* thin, 20 μ long. Genital orifice at 15 μ in front of the ℓ 1 setae. There are 4 genital spines: two anterior 18 μ long and two posterior paramedian and unequal; one is slightly thicker and longer (100 μ) than the other (80 μ). *d* 1, *d* 2, ℓ 2 and *d* 3 are thick and 36 μ , 36 μ , 90-100 μ and 75 μ long respectively. In specimens of *E. bispinosa* from Central Africa these measurements are the following: two posterior paramedian genital spines 66 μ and 32 μ long; the *d* 1, *d* 2, ℓ 2 and *d* 3 are 29 μ , 36 μ , 72 μ and 85 μ long. Penis extremely thin and twisted in its apical two-thirds, its total length about 200-225 μ long. There is a small bare (non striated) area between the *d* 3 and the *d* 4 setae. Setae *d* 4, *d* 5 and ℓ 4 are 45 μ , 40 μ and 40 μ long respectively. Venter: Coxal setae 2-3-0-1. Setae

ic 3 and *ic* 4 are thin and long (respectively 60 μ and 105 μ); setae *ic* 4 shorter (16 μ) than the coxal IV seta (27 μ). There is a transversally-elongate bare area behind setae *ic* 4; it is 36 μ long and 75 μ wide. Legs: Tarsi II with two very unequal claws. Tarsi III-IV with only one long claw. Coxa I distinctly produced laterally.

Female (Fig. 58): Allotype 561 μ long and 180 μ wide. Allotype female resembles closely the holotype female of *E. bispinosa* described by Radford and redescribed by Fain (in press).

Host and locality

On *Tadarida jobensis* (Miller, 1902), from Mount Hart, 10 to 28.IX.1977 (bats no. 2623, 2685, 2687, 2688, 2692, 2696, 2701, 2704 and 2711) (holotype and 9 paratype males, allotype and 4 paratype females, 4 paratypes immature).

GENUS *UGANDOBI*A DUSBABEK, 1968

The genus *Ugandobia* consisted so far of 3 subgenera: *Ugandobia* Dusbabek, 1968, *Embamyobia* Fain, 1972 and *Expletobia* Dusbabek & Lukoschus, 1971. We think now that *Embamyobia* is a synonym of the typical subgenus and that *Expletobia* should become an independent genus. *Ugandobia* comprised, until now, 8 species, from which 5 have been described from Emballonuridae: only one species is known from a Hipposideridae and one from a Pteropidae.

We describe here a new species from an Emballonuridae in Western Australia.

1 *UGANDOBI*A *AUSTRALIENSIS* SP. NOV.

This new species is represented by only males and immatures. The male is distinguished from those of *U. barnleyi* (Radford), *U. emballonurae* Fain and *U. ituriensis* Fain, by the much greater length of setae *ic* 2 to *ic* 4. In *U. euthrix* Fain these setae are also long but this species is distinguished from our new species by the larger size of the body, the aspect of the *sc i* setae, very short and thin, the much smaller length of the dorsal seta of trochanter IV, the thinner aspect of *v i* (7,5 wide), the greater length of the penis.

Male (Figs 29, 59-60): Holotype 370 μ long and 150 μ wide. Dorsum: Genital orifice situated at 22 μ behind the *sc i* setae; there are 5 pairs of genital setae. Penis with 2 curves, 200 μ long. Setae *d 1* toothed, inflated basally and 26 μ long. Setae *d 2* 45 μ long, situated 25 μ in front of *l 1*. Opisthonotum with 3 pairs of strong setae 22 to 28 μ long. Venter: Setae *ic 1* to *ic 4* 30 μ , 60 μ , 65 μ and 72 μ long respectively. Coxal setae: 2-3-0-1. Legs: Trochanter I with laterally a medium-sized triangular prolongation. Chaetotaxy of legs (II-IV): Trochanters 3-3-3. Femora 5-2-2. Genua and tibiae 6-6-6. Tarsi 7-6-6. Most of these setae are long and thin; dorsal seta of trochanter IV 36 μ long.

Host and locality

On *Taphozous flaviventris* Peters, 1867, from Beverley Springs, 18.IX.1976, bat no. 2724 (holotype and 4 paratype males, 5 paratype nymphs).

GENUS *PTERACARUS* JAMESON & CHOW, 1952

This genus has been revised by Dusbabek (1973). This author records two species from Australia: *Pteracarus chalinolobus* (Womersley) and *Pteracarus* sp.

1 *PTERACARUS CHALINOLOBUS* (WOMERSLEY, 1941)

MYOBIA CHALINOLOBUS WOMERSLEY, 1941: 55

RADFORDIA CHALINOLOBUS RADFORD, 1951: 273

PTERACARUS CHALINOLOBUS JAMESON & CHOW, 1952:

218 (part.) DUSBABEK, 1973: 250

PTERACARUS SP. A., DUSBABEK, 1973: 283

Dusbabek (1973) has redescribed the holotype female of this species collected on *Chalinolobus gouldi* from South Australia. The holotype is deposited in the collection of the South Australian Museum, Adelaide.

In Western Australia we found on three different hosts, numerous female specimens of *Pteracarus* which agree with the holotype female that we have examined. Moreover our male specimens agree with the male from an unidentified host that Womersley had identified as belonging to the same species (*Pteracarus* sp. A. of Dusbabek).

We describe here the male of *P. chalinolobus*, so far not described.

Male (Figs 26, 61-62): We describe here a specimen from *Chalinolobus gouldi*. Body 235 μ long and 130 μ wide. Dorsum: Lengths of *vi*, *sc e* and *l 1* are 63 μ , 93 μ and 100 μ . Setae *ve* very short, *sci* very thin and 7 μ long. Genital area with 3 pairs of very short and thin anterior setae and 2 pairs of longer subequal posterior setae. Setae *d 1* toothed and shorter (8 to 8,5 μ) than *d 2* (20 μ) which is not toothed. Setae *l 3* are 7-8 μ long. Venter: Setae *ic 1* very thin and 30-35 μ long, *ic 2* 45 μ , *ic 3* 60 μ and *ic 4* 12 μ . Gnathosoma: 30-33 μ wide and 25 μ long ventrally. Chaetotaxy of the legs II-IV: Trochanters 3-3-3. Femora 5-3-3. Genua 7-6-6. Tibiae 6-6-6. Tarsi 7-6-6.

Hosts and localities

- 1 *Chalinolobus gouldii*, South Australia (bat no. M401,506) (holotype female). From the same host, from Beagle Bay, W. Australia, 25.VIII.1976 (bat no. 2616) (1 male and 6 females) (Coll. F. Lukoschus).
- 2 *Chalinolobus nigrogriseus rogersi*, from Beverley Springs, W. Australia, 28.VIII to 23.IX.1976 (bats no. 2621, 2622, 2649, 2762, 2763, 2765, 2771 and 2789) (8 females and 2 nymphs).
- 3 *Nycticeius greyi*, from Beverley Springs, 21.IX.1976 (bat no. 2781) (4 males), and from Beagle Bay, 23.VIII.1976 (bat no. 2612) (2 males and 3 nymphs).
- 4 *Eptesicus pumilus*, from Beverley Springs, 19-21.IX.1976 (bats no. 2739 and 2740) (4 females, 2 males, 11 nymphs).
- 5 *Eptesicus douglasi*, from Geikie Gorge, 4 to 9.X.1976 (bats no. 2911, 2915, 2916, 2926, 2931, 2979 and 2980) (20 males, 12 females, 60 immatures); from Brooking Springs, 3.X.1976 (bats no. 2893 and 2903) (8 males, 8 females and 5 nymphs); from Beverley Springs, 19.IX.1976 (bat no. 2745) (2 males).
- 6 (?) *Nycticeius greyi*, from Mitchell Plateau, 22.X.1976 (bat no. 3076) (3 immatures).
- 7 A male specimen identified by Womersley as *Pteracarus chalinolobus* from an unidentified bat, Adelaide, 26.2.60.

The mites collected in Western Australia were located on the wing membrane; the adults were attached with their legs to the skin and not to the hair.

2 *PTERACARUS MICRODORSALIS* SP. NOV.

This new species is distinguished from *P. chalinolobus* in the female by the very small size of *d* 1, *d* 2 and *d* 3; in the male by the greater length of *d* 2.

Female (Figs 63-65): Holotype 390 μ long and 324 μ wide. Dorsum: Setae *v e*, *sc e* and ℓ 1 95-100 μ , 135 μ and 140-145 μ long respectively. Setae *v i* stout rods, 16 μ long, 26 μ apart. Setae *sc i* fine, 57 μ apart. Setae *d* 1 and *d* 2 1 to 2 μ long, *d* 3 almost vestigial. The ℓ 3 and ℓ 4 are thick and toothed, 25 and 27 μ long respectively. Venter: Setae *ic* 1 very thin and 45 μ long; setae *ic* 2 to *ic* 4 75 μ , 75 μ and 21 μ long. Setae *g* 1 thick and 25 μ long. Coxal II setae thin. Legs stout, with setae relatively strong. Chaetotaxy of the legs (II-IV): Trochanters 3-3-3. Femora 5-3-3. Genua 7(6)-6-6. Tibiae 6-6-6. Tarsi 7-6-6. Femora II to IV with 1 posterior spine.

Male (Figs 27, 66-67): Allotype 282 μ long and 160 μ wide. Dorsum: Setae *v i* and *sc i* very thin and very short. Setae *v e*, *sc e* and ℓ 1 80-90 μ , 110 μ and 104 μ long. Genital orifice situated at 30 μ behind *sc e*. Setae *d* 1 very thin, not toothed and 9 μ long; setae *d* 2 are stronger, cylindrical and 30 μ long. Genital plate with 3 pairs of thin and short setae and two pairs of stronger unequal posterior setae. All the coxal setae are thin except coxal IV. Legs as in the female.

Host and locality

The mites were located on dorsum of tail membrane close to tail base.

- 1 *Nyctophilus* (?), from Beverley Springs, 20.IX.1976 (bats no. 2768 and 2772) (holotype female, allotype male and 2 paratype nymphs).
- 2 *Nyctophilus bifax* Thomas, 1915, from Beagle Bay, 23.VIII.1976 (bat no. 2603) (1 female, 1 male paratype).
- 3 *Nyctophilus arnhemensis* Johnson, 1959, from Beagle Bay, 23.VIII.1976 (bat no. 2611) (1 female, 1 male and 2 immatures, paratypes).

GENUS *PTEROPIMYOBIA* FAIN, 1973

This genus was represented until now by two species from Asiatic Pteropidae: *P. pahangensis* Fain, from *Macroglossus minimus sobrinus*, of Malaysia, and *P. nyctimene* Fain, from *Nyctimene bougainvillei*, of Bougainville Is. The first species is known only from the female, while in the second both sexes have been described.

We have found on *Macroglossus minimus* a mite that is very close to *P. pahangensis*. It is distinguished from it mainly by the presence of an

accessory tooth on the ventro-internal surface of the tibio tarsus of leg I. We think it therefore necessary to separate in in a new subspecies.

It is to be noted that some mammalogists consider at present that *Macroglossus* is not represented in northern Australia by the species *lagochilus* as thought so far, but by the species *minimus* and that the species which is encountered in Malaysia should correctly be named *M. sobrinus* and not *M. minimus sobrinus*. (Start, pers. comm.)

PTEROPIMYOBIA PAHANGENSIS SUBSP.

QUINQUEDENS SUBSP. NOV.

Female: Holotype 498 μ long and 192 μ wide. Characters as in the typical form except that there are 5 teeth on the ventral surface of tibiotarsus I instead of 4 in the typical form.

Male (Figs 30, 68-69): Allotype 455 μ long and 180 μ wide. Dorsum: Genital orifice situated at 9 μ in front of setae *sc e*. Penis 130 μ long, straight. Setae *v i* and *sc i* very small. Setae *d 1* and *d 2* subequal, 55-58 μ long. Venter: Coxals scaly, wide and striate; *ic 1* also in the shape of a scale; *ic 2* and internal coxal II foliate-striate; *ic 3*, *ic 4* and *g 1* as *ic 2*. Leg I as in the female. Genu I with a strong ventral spine 21 μ long.

Host and locality

On *Macroglossus minimus*, Mitchell Plateau, 19 and 20.X.1976 (bats no. 3013, 3016, 3018, 3019, 3020, 3022, 3023 and 3042) (holotype and 9 paratypes female, allotype and 12 paratypes male, 21 nymphs, larvae or eggs all paratypes).

The adult mites had their legs I embedded into the hair follicle and partly attached to the hair with the lateral prolongation of genu I.

GENUS *BINUNCUS* RADFORD, 1954

1 *BINUNCUS MAGNUS* (RADFORD, 1934)

MYOBIA MAGNA RADFORD, 1934: 363

BINUNCUS MAGNA RADFORD, 1954: 242; FAIN (in press)

This species has been described from a bat, *Pteropus giganteus* which was kept in captivity in England. Fain (in press) has redescribed and has given new figures of both sexes of that species.

In Australia we have found this species on *Pteropus alecto* Temminck, 1837, from Brooking Springs, 28-29.IX.1976 (bats no. 2805, 2819 and 2822) (31 females, 3 males and 41 nymphs), 1.X.1976 (bat no. 2962) (2 nymphs) and 2.X.1976 (bat no. 2877) (1 larva).

Other specimens, only females and nymphs, have been collected from *Pteropus gouldii*, from Indooroopilly, Queensland, by Domrow (specimens sent to the senior author) and by the senior author from a *Pteropus* sp. bat captured in Australia and preserved in the Institut royal des Sciences naturelles, Brussels, Belgium.

2 *BINUNCUS FORTIS* SP. NOV.

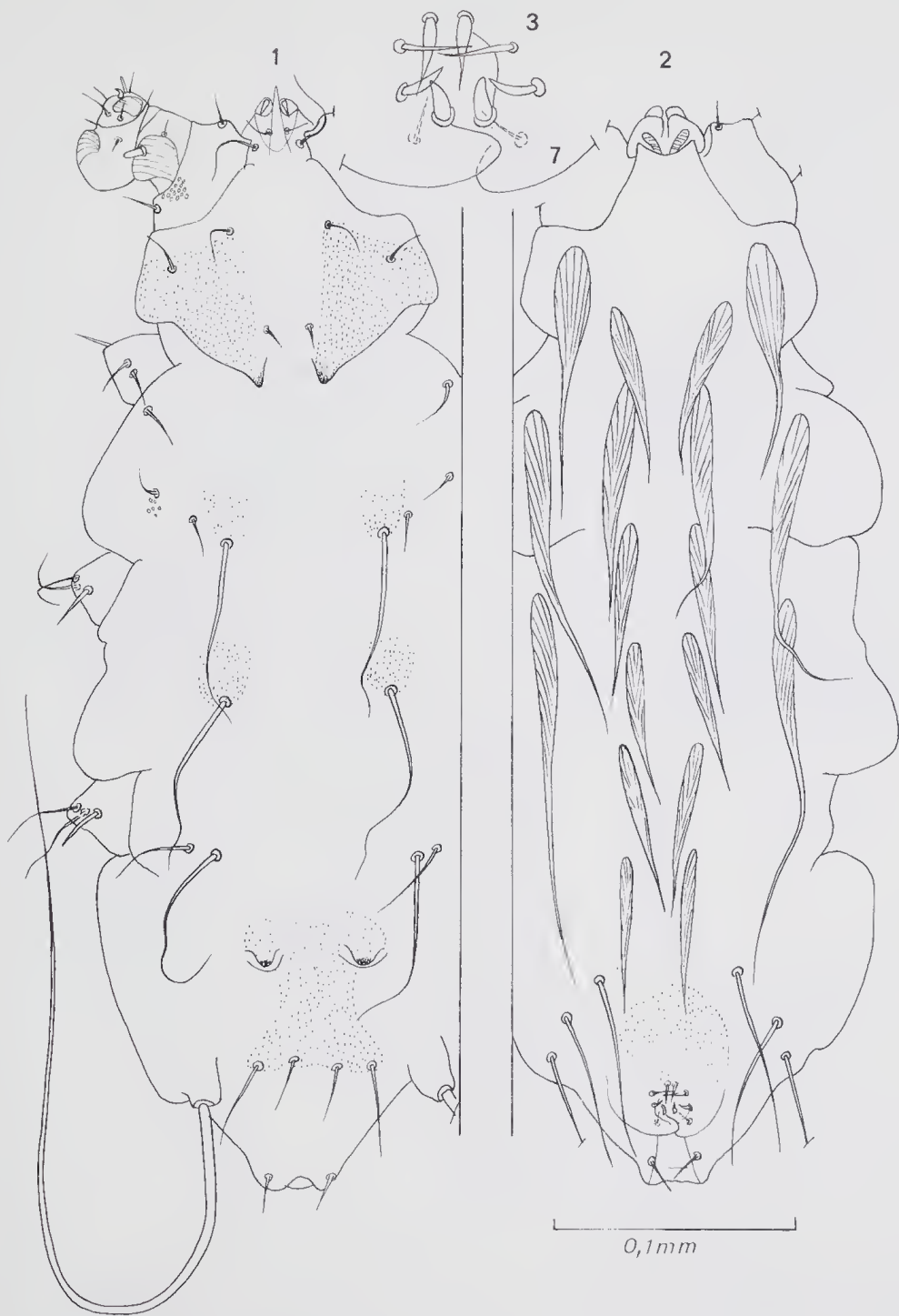
This species is distinguished from *B. magnus* in the female by the greater size of the body; in the male mainly by the different structure of the genital area and the different shape and disposition of some dorsal setae.

Male (Figs 28, 70-71): Holotype 570 μ long and 294 μ wide. Dorsum: Genital aperture at 40 μ behind the *sc e* setae. The genital plate bears 3 pairs of small anterior spinelets and 2 pairs of posterior thin and short unequal setae; this plate is prolonged posteriorly by a narrow elongate sclerite enlarged basally. Penis thick in its basal part (100 μ long) and extremely thin apically. Setae *sc i* thick and short. Setae *d 1* and *d 2* subequal (100-105 μ). Distance *d 1-d 2* 50 μ , which is distinctly greater than in *B. magnus*. Venter as in *B. magnus*. The distance *ic 3-ic 3* is 93 μ ; the distance *ic 4-ic 4* = 66 μ ; distance coxal IV-coxal IV is 72 μ . Other characters as in *B. magnus*.

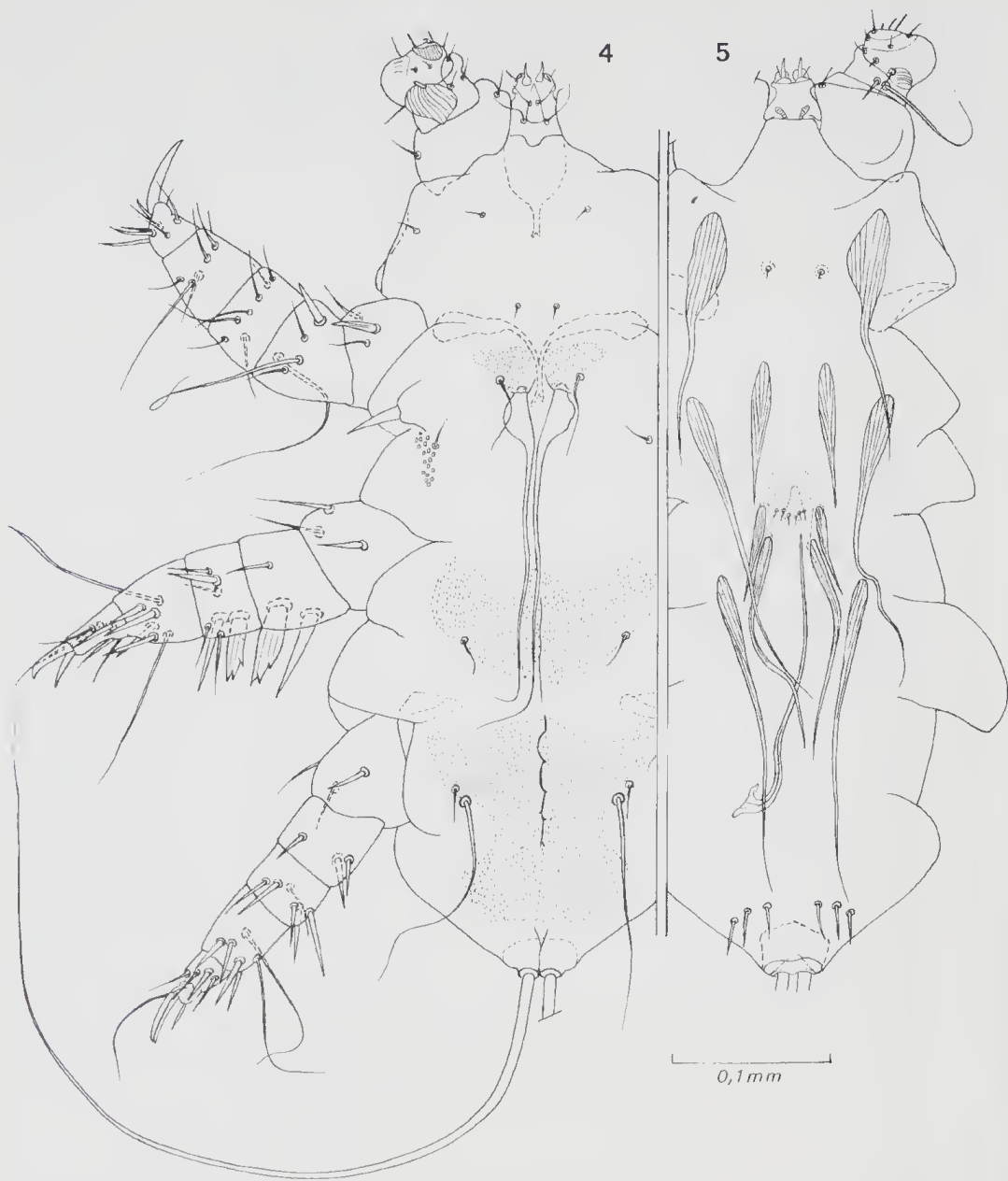
Female (Figs 72-74): Allotype 855 μ long and 455 μ wide. General aspect as in *B. magnus*. Dorsum: Setae *sc i*, *sc e*, *d 1*, $\ell 1$ 135 μ , 230 μ , 120 μ , 270 μ long. Legs II-IV with two long unequal claws, bearing thin setae except tibiae III and IV which carry a strong recurved ventral spine 33 to 39 μ long. Leg I and gnathosoma as in *B. magnus*.

Host and locality

On *Pteropus scapulatus* Peters, 1862, from Western Australia, from three different localities: Brooking Springs, 1.X.1976 (bat no. 2876) (holotype male, allotype female and 17 paratypes immatures; Napier Downs 31.VIII.1976 (bats no. 2634 and 2636) (1 paratype male and 8 paratypes immatures); Geikie Gorge, 6.X.1976 (bat no. 2952) (2 paratypes nymphs).



Figs 1-3: *Acanthophthirius clarus* (Wom.). Lectotype female. Fig. 1 — ventral view; Fig. 2 — dorsal view; Fig. 3 — genital area.



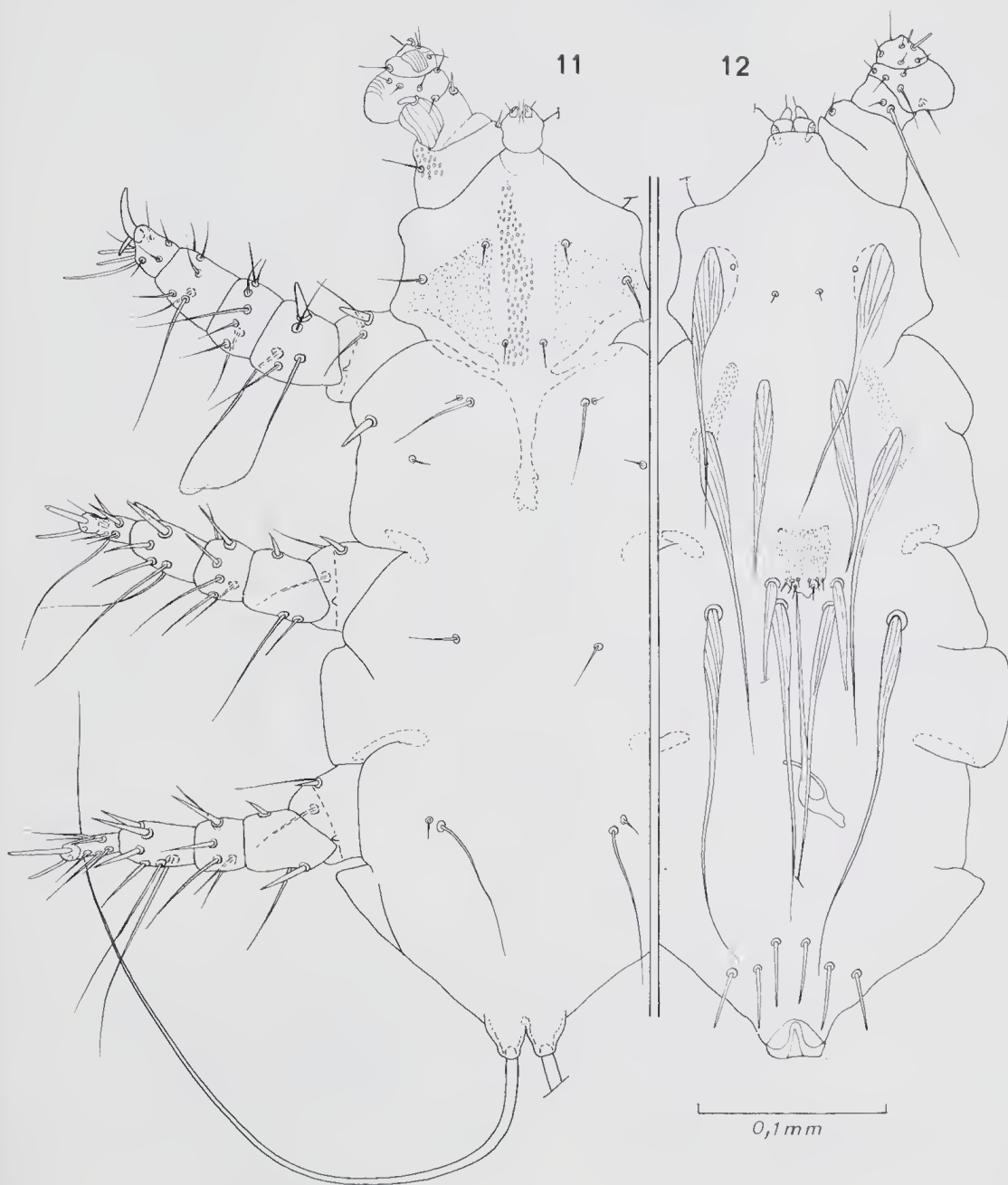
Figs 4-5: *Acanthophthirius* (A.) *womersleyi* sp. nov. Holotype male. Fig. 4 — ventral view; Fig. 5 — dorsal view.



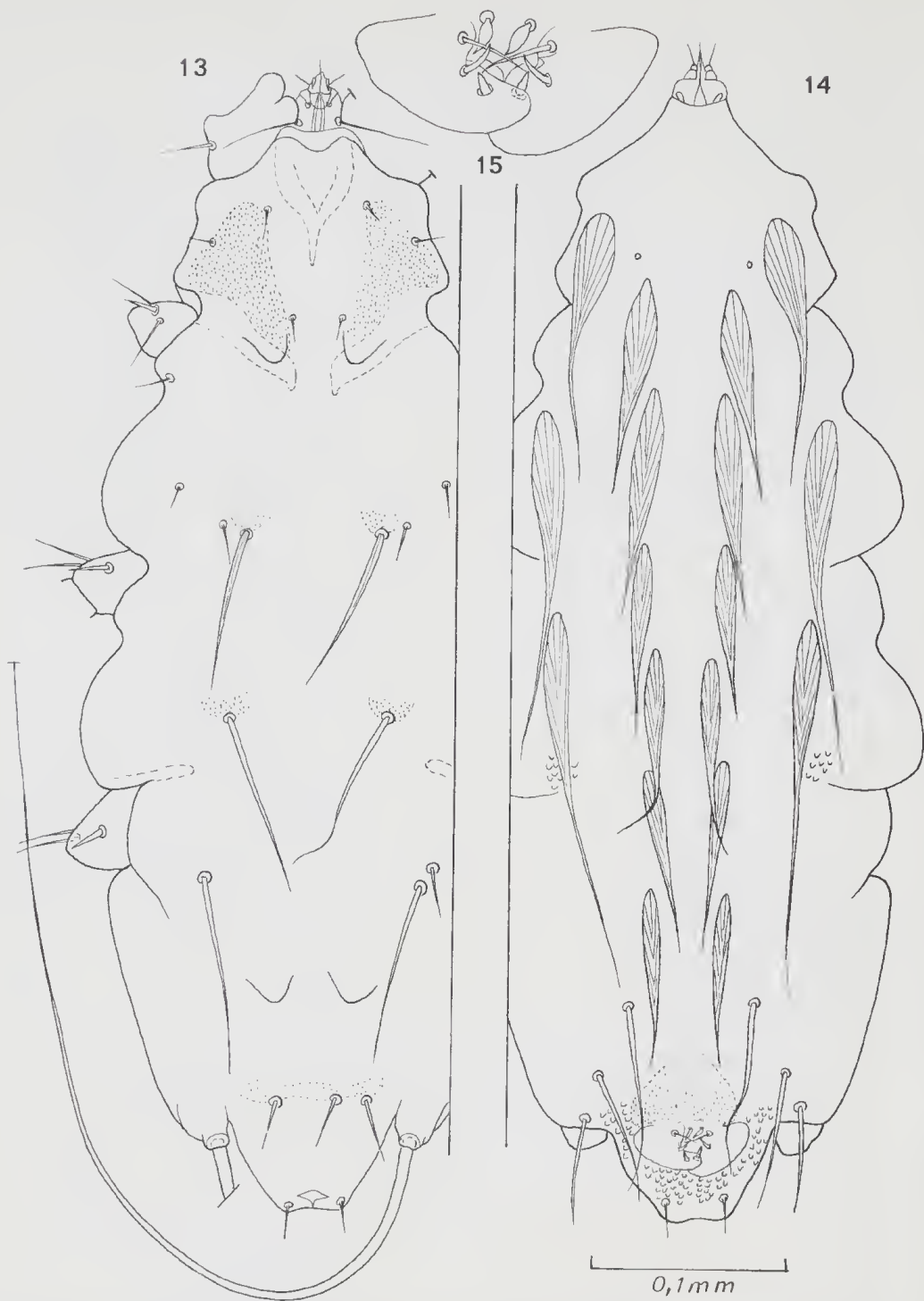
Figs 6-7: *Acanthophtirius* (A.) *acinipus* sp. nov. Holotype male. Fig. 6 — in ventral view; Fig. 7 — dorsal view.



Figs 8-10: *Acanthophthirius* (A.) *acinipus* sp. nov. Allotype female. Fig. 8 — ventral view; Fig. 9 — dorsal view; Fig. 10 — genital area.



Figs 11-12: *Acanthophthirius* (A.) *intercalatus* sp. nov. Holotype male. Fig. 11 — ventral view; Fig. 12 — dorsal view.



Figs 13-15: *Acanthopthirius* (A.) *intercalatus* sp. nov. Allotype female. Fig. 13 — ventral view; Fig. 14 — dorsal view; Fig. 15 — genital area.



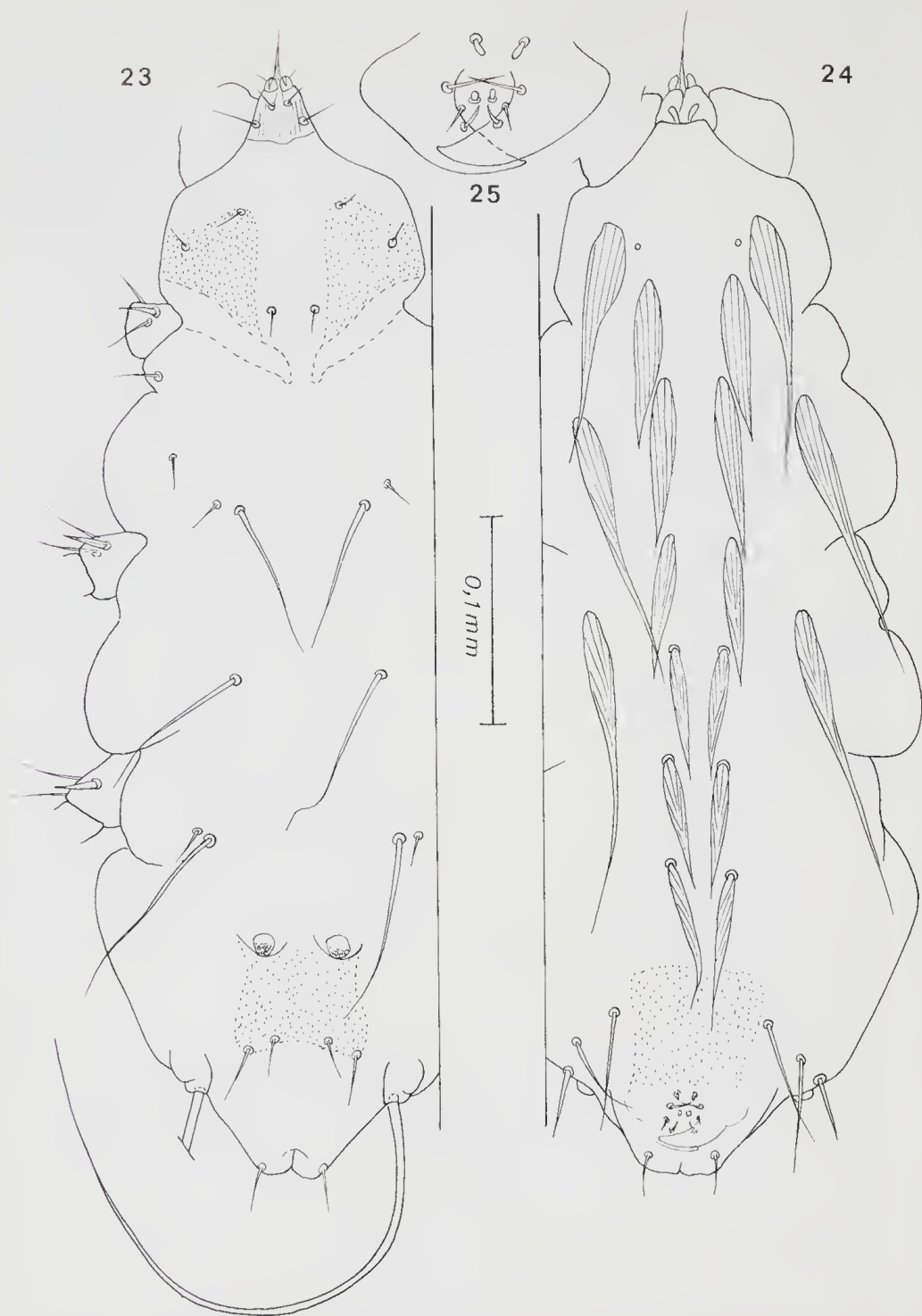
Figs 16-18: *Acanthophthirius (Myotimyobia) minimus* (Wom.). Female. Fig. 16 — ventral view; Fig. 17 — dorsal view; Fig. 18 — genital area.



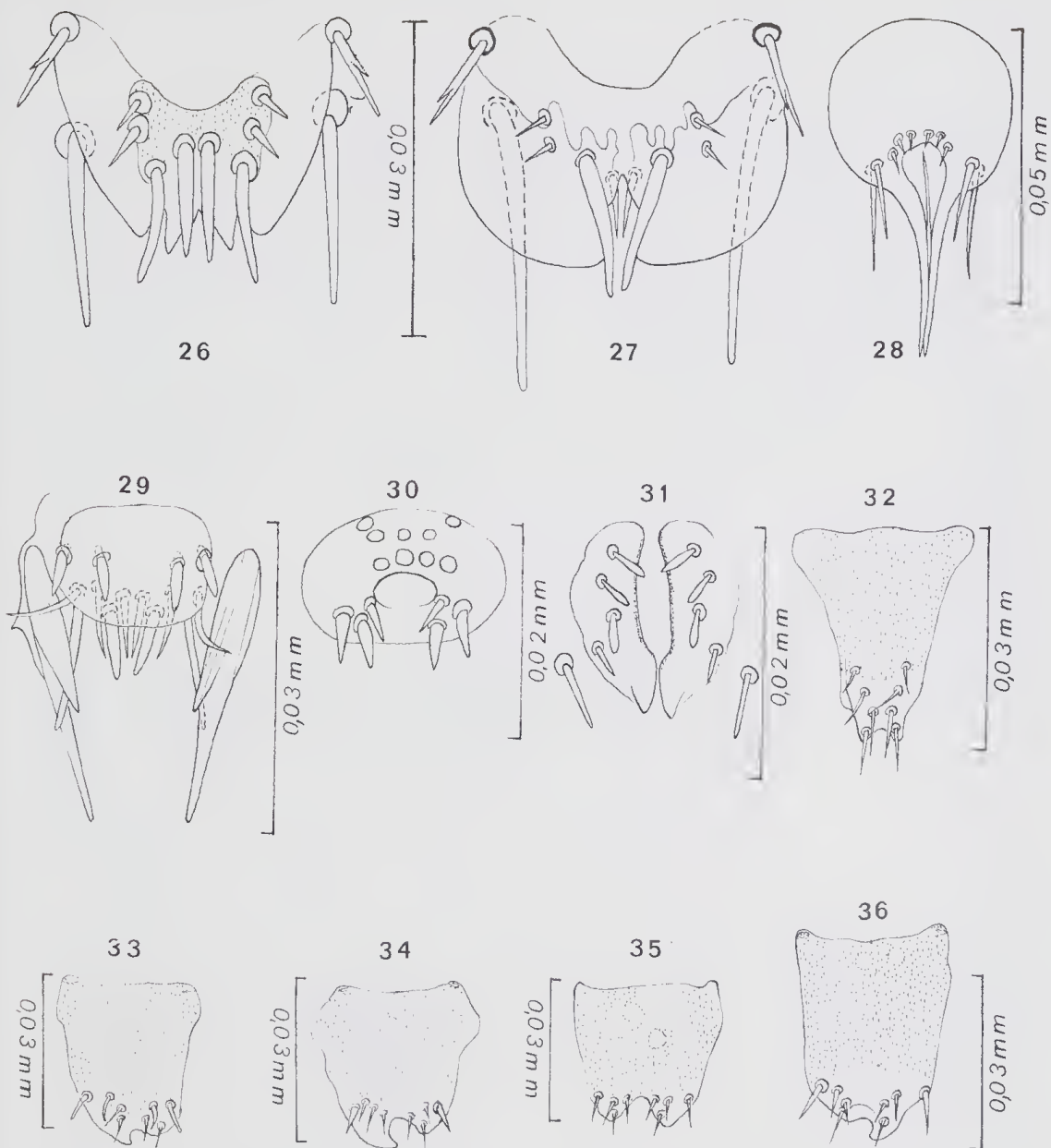
Figs 19-20: *Acanthophthirius* (*Myotimyobia*) *minimus* (Wom.). Male. Fig. 19 — dorsal view; Fig. 20 — ventral view.



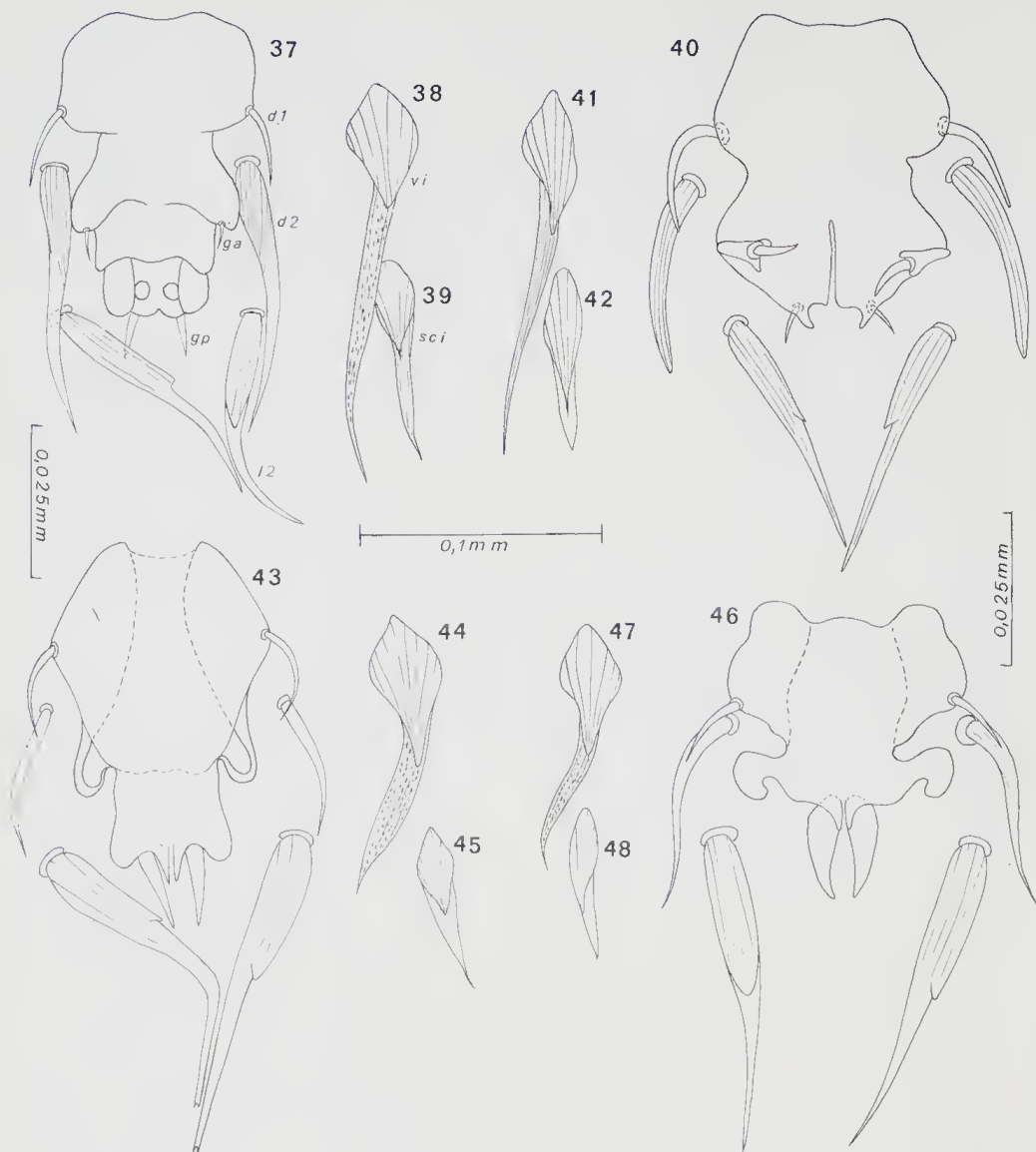
Figs 21-22: *Acanthopthirius* (*Myotimyobia*) *alatus* sp. nov. Holotype male.
Fig. 21 — ventral view; Fig. 22 — dorsal view.



Figs 23-25: *Acanthophtirius* (*Myotimyobia*) *alatus* sp. nov. Allotype female.
Fig. 23 — ventral view; Fig. 24 — dorsal view; Fig. 25 — genital area.

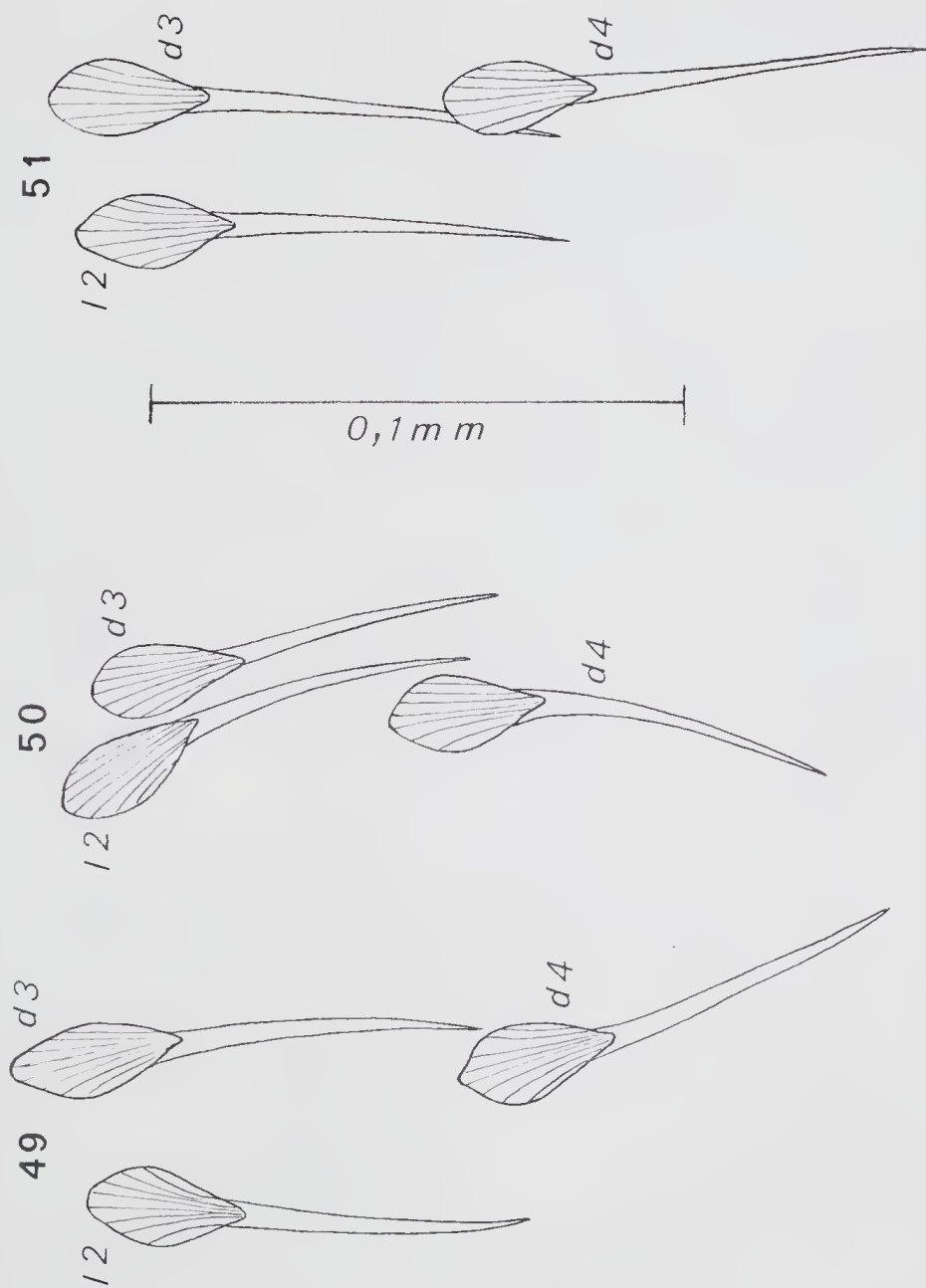


Figs 26-36: Genital area in the males of: Fig. 26 — *Pteracarus chalinolobus*; Fig. 27 — *Pteracarus microdorsalis*; Fig. 28 — *Binuncus fortis*; Fig. 29 — *Ugandobia australiensis*; Fig. 30 — *Pteropimybobia pahangensis quinquedens*; Fig. 31 — *Hipposiderobia belli*; Fig. 32 — *Acanthophthirius minimus*; Fig. 33 — *A. womersleyi*; Fig. 34 — *A. alatus*; Fig. 35 — *A. acinipus*; Fig. 36 — *A. intercalatus*.

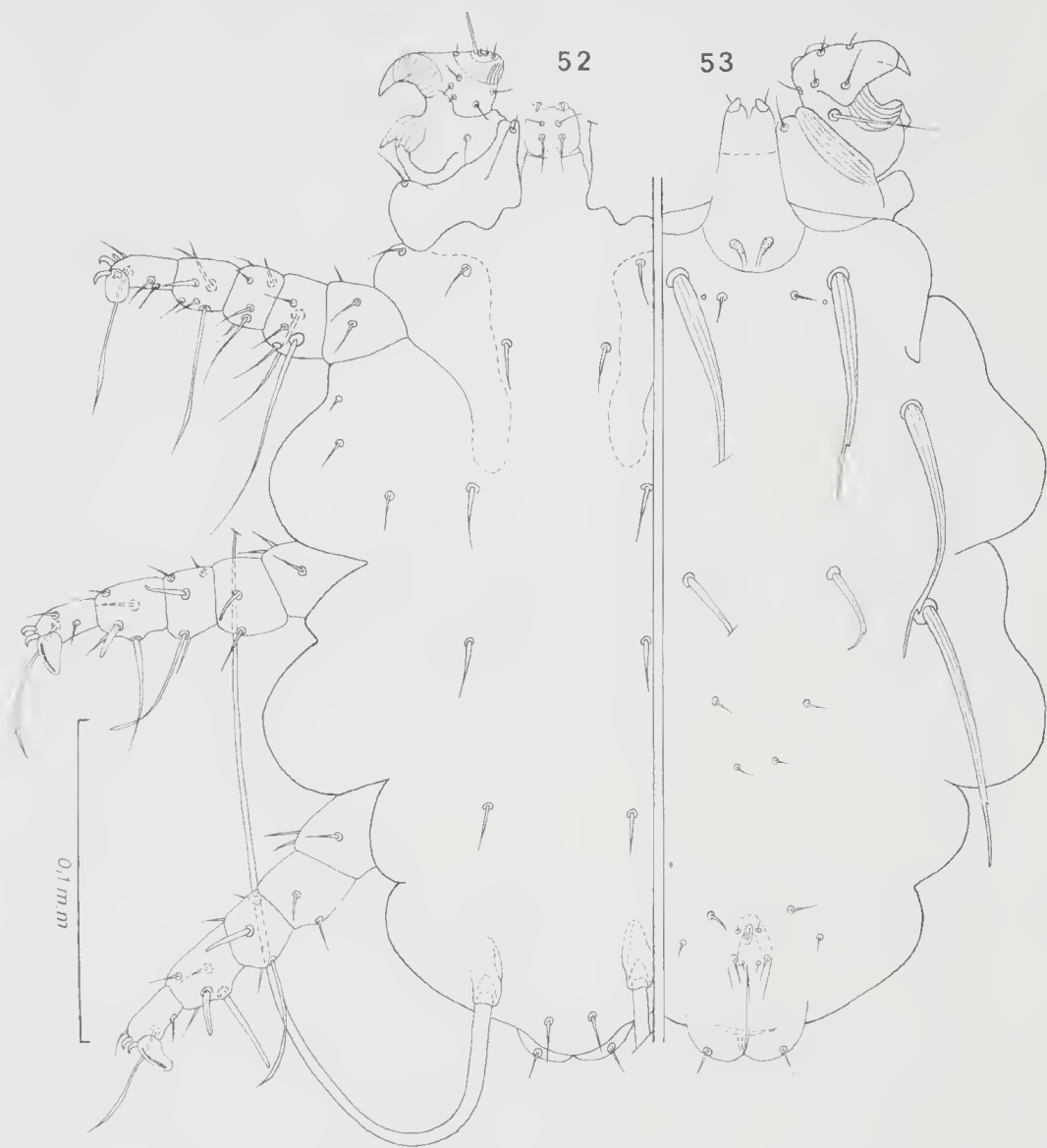


Figs 37-42: *Calcarmyobia rhinolophia* Radford. Holotype male. Fig. 37 — genital area; Figs 38-39 — setae *vi* and *sci*; Figs 40-42 — specimen from Czechoslovakia. Fig. 40 — genital area. Figs 41-42 — setae *vi* and *sci*.

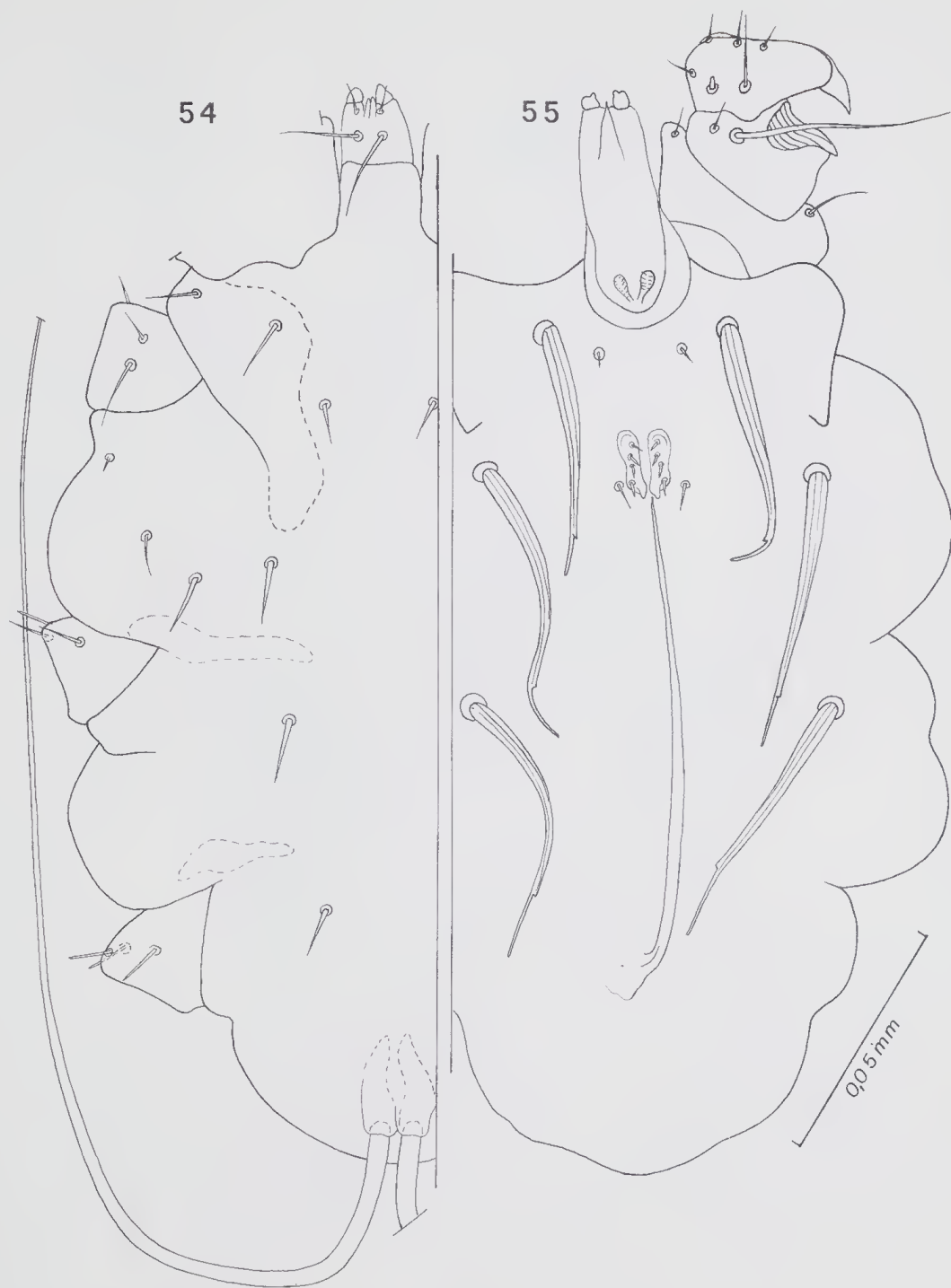
Figs 43-48: *Calcarmyobia miniopteris* Wom. Male specimen from *Miniopterus schreibersi* from Japan. Fig. 43 — genital area. Fig. 44-45 — setae *vi* and *sci*. Male specimen from *Miniopterus australis* from Queensland. Fig. 46 — genital area. Figs 47-48 — setae *vi* and *sci*.



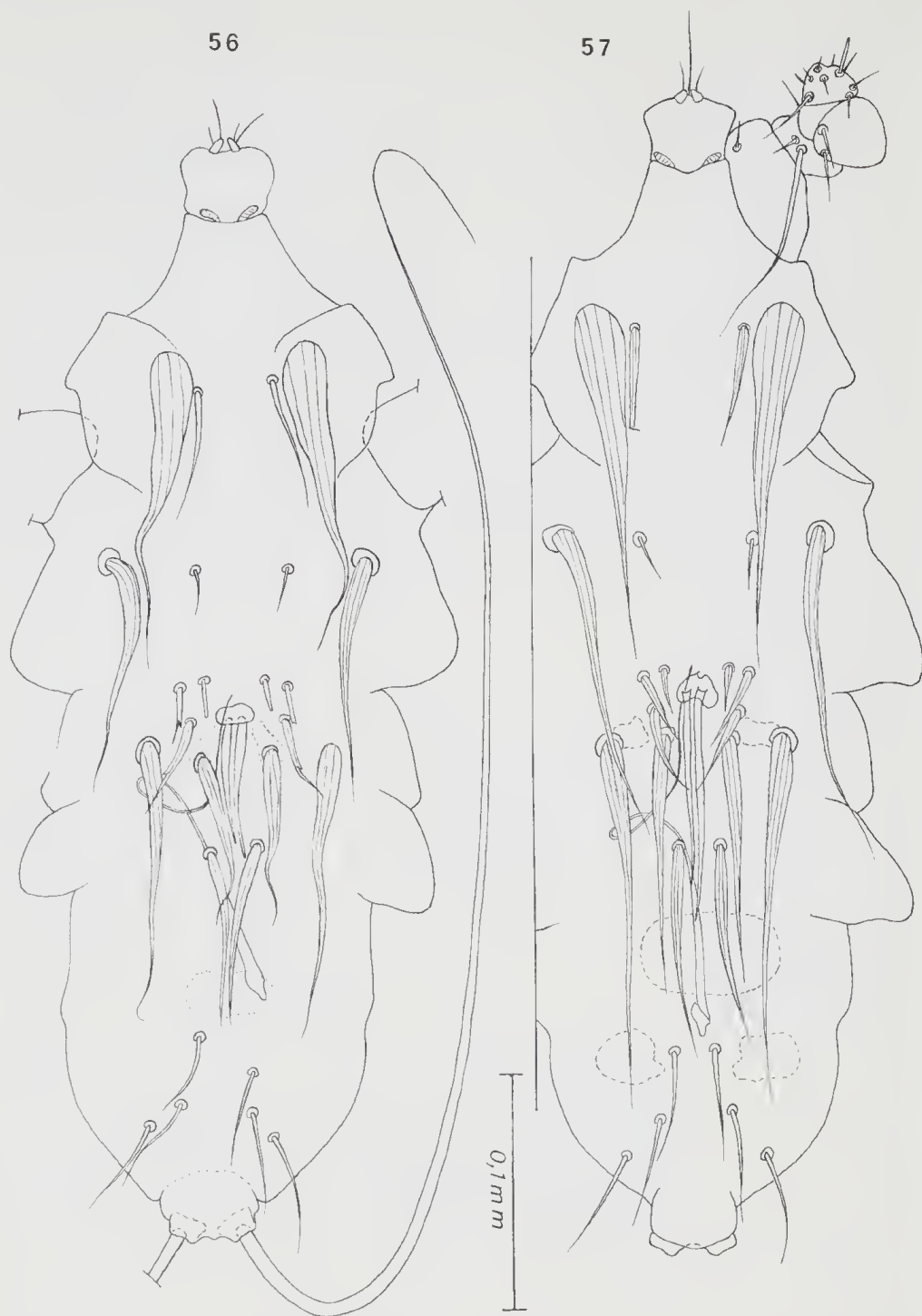
Figs 49-51: Setae $l\ 2$, $d\ 3$ and $d\ 4$ in: Fig. 49 — *Calcaromyobia rhinolophia* Radford. Holotype male.
 Fig. 50 — *Calcaromyobia miniopterus* Wom. Male from *Miniopterus schreibersi* from Japan. Fig. 51 —
Calcaromyobia miniopterus Wom. Male from *Miniopterus australis*, from Queensland.



Figs 52-53: *Hipposiderobia belli* sp. nov. Holotype female. Fig. 52 — ventral view; Fig. 53 — dorsal view.



Figs 54-55: *Hipposiderobia belli* sp. nov. Allotype male. Fig. 54 — ventral view; Fig. 55 — dorsal view.



Figs 56-57: Fig. 56 — *Ewingana bispinosa* Radford. Dorsum of a male from *Tadarida* sp., in Rwanda. Fig. 57 — *E. bispinosa longispina* ssp. nov. Dorsum of holotype male.

58

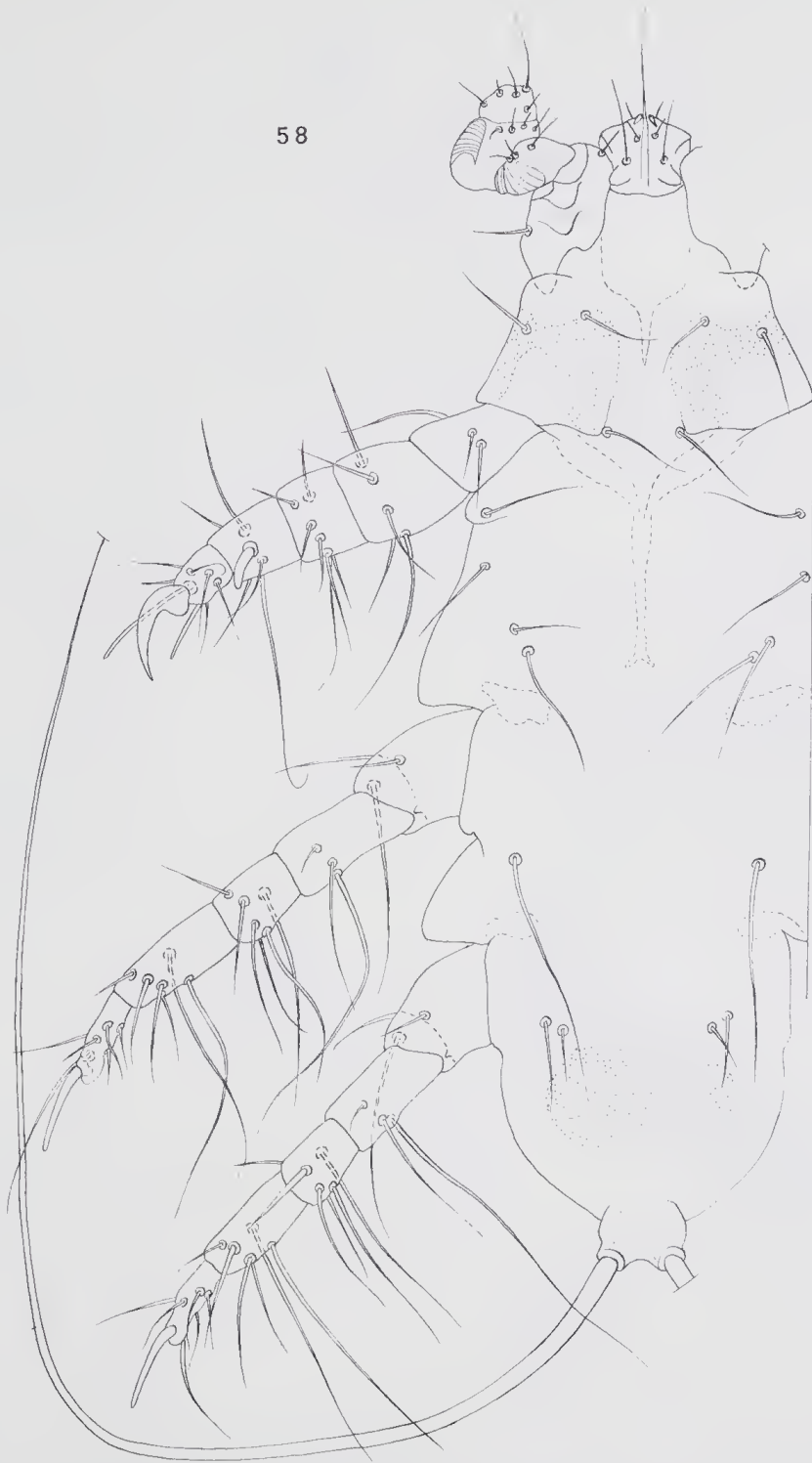


Fig. 58: *Ewingana bispinosa longispina* ssp. nov. Venter of allotype female.



Figs 59-60: *Ugandobia australiensis* sp. nov. Holotype male. Fig. 59 — ventral view; Fig. 60 — dorsal view.

61



Fig. 61: *Pteracarus chalinolobus* (Wom.). Male in ventral view (specimen from *Chalinolobus gouldii*).

62

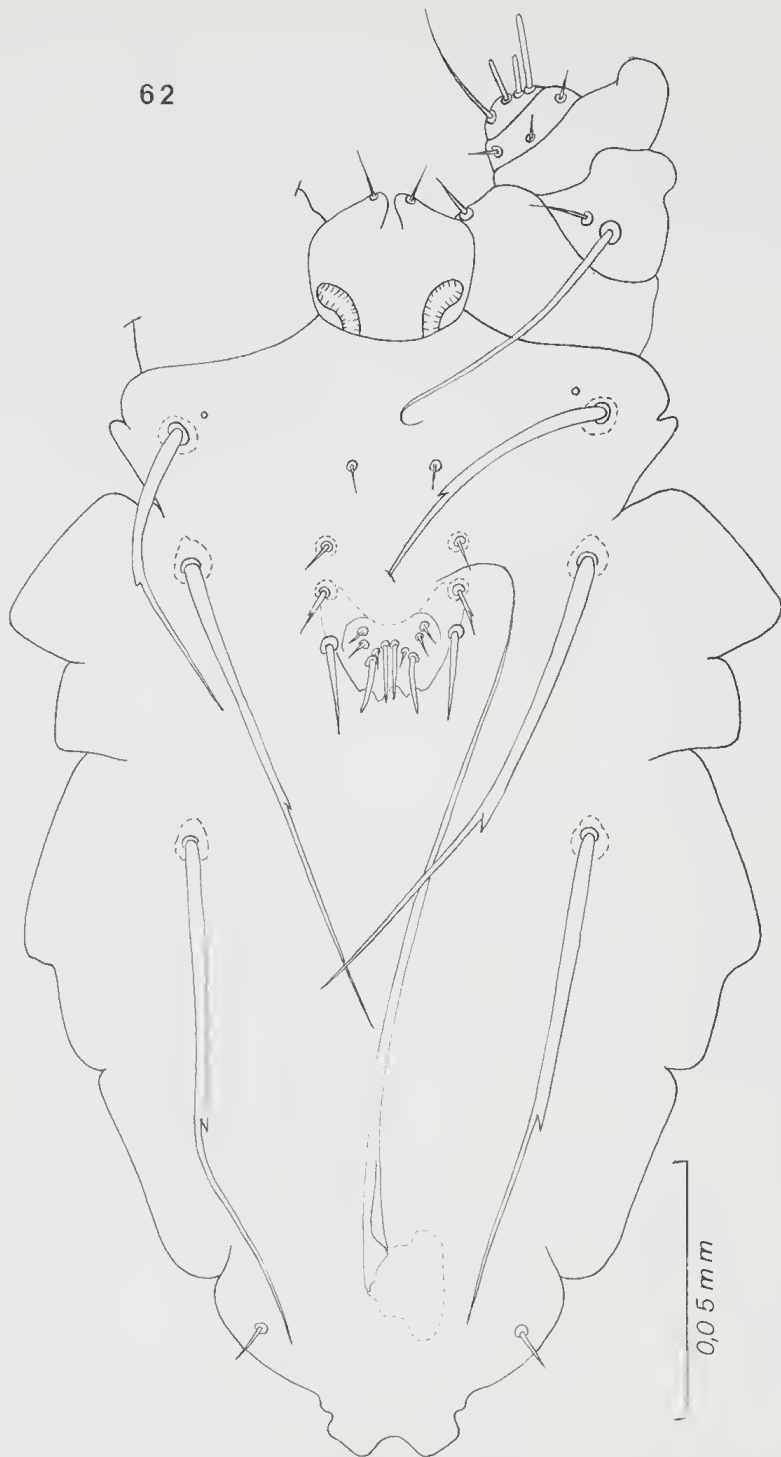
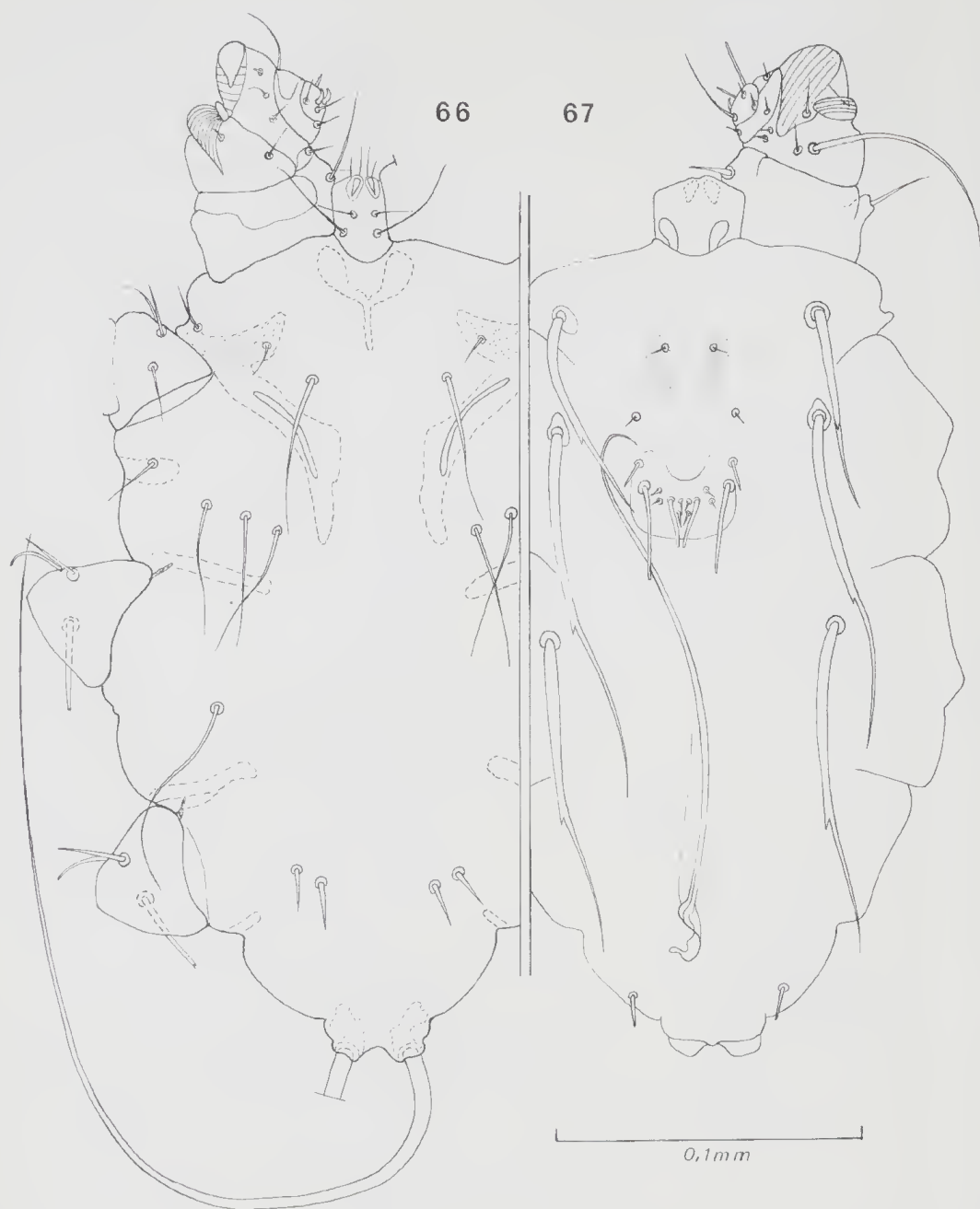


Fig. 62: *Pteracarus chalinolobus* (Wom.). Male in dorsal view (specimen from *Chalinolobus gouldii*).



Figs 63-65: *Pteracarus microdorsalis* sp. nov. Holotype female. Fig. 63 — ventral view; Fig. 64 — dorsal view; Fig. 65 — genital area.



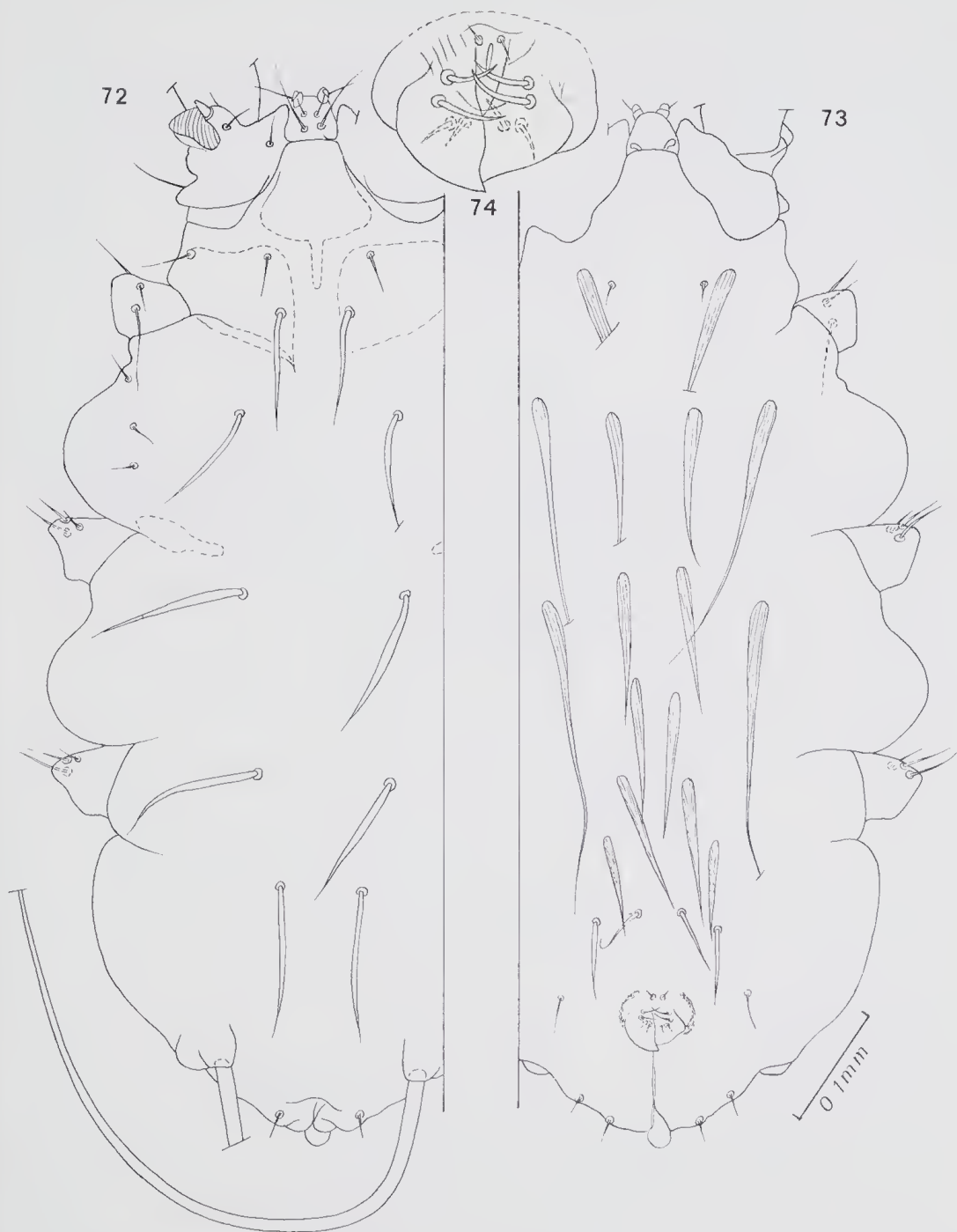
Figs 66-67: *Pteracarus microdorsalis* sp. nov. Male allotype. Fig. 66 — ventral view; Fig. 67 — dorsal view.



Figs 68-69: *Pteropimyobia pahangensis quinquedens* ssp. nov. Allotype male.
Fig. 68 — ventral view; Fig. 69 — dorsal view.



Figs 70-71: *Binuncus fortis* sp. nov. Holotype male. Fig. 70 — ventral view; Fig. 71 — dorsal view.



Figs 72-74: *Binuncus fortis* sp. nov. Allotype female. Fig. 72 — ventral view; Fig. 73 — dorsal view; Fig. 74 — genital area.

ACKNOWLEDGEMENTS

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